ADDISON WESLEY

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Math Makes Sense 5

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Curriculum Companion

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Using Your Curriculum Companion

Addison Wesley Mathematics Makes Sense is comprehensive program designed to support teachers in delivering core mathematics instruction in a way that makes mathematical concepts accessible to all students – letting your teach for conceptual understanding, and helping students make sense of the mathematics they learn. ***Addison Wesley Mathematics Makes Sense*** was specifically written to provide 100% curriculum coverage for Ontario teachers and students. The ***Math Makes Sense*** development team wrote, reviewed, and field tested materials according to the requirements of The Ontario Curriculum, Mathematics, released in 1997. Now, with Ontario's initiative or Sustaining Quality Curriculum, the same development team is pleased to provide further support in this **Curriculum Companion**.

Your Curriculum Companion provides you with the specific support you need to maintain 100% curriculum coverage according to the revised 2005 release of The Ontario Curriculum. In this module, you will find:

What's New at Grade 5?
This one-page overview provides your year-at-a-glance, with notes detailing where new curriculum requirements have arisen in the 2005 curriculum.

Unit Planning Charts
For each unit, a one-page overview that recommends required or optional lessons, and indicates whether this module provides additional teaching support to ensure curriculum coverage.

Curriculum Focus Notes
The revised curriculum introduced some new expectations that already form part of the overall conceptual framework on which your Grade 5 program was built. In order to meet these expectations in a more explicit way, **Curriculum Focus Notes** suggest ways that you might use the ***Math Makes Sense 5*** Student Book lesson content to address the expectations. If relevant, the suggestion includes use of an **Extra Practice** master, available in reproducible form following the teaching notes.

Curriculum Focus Lessons
Some expectations in the 2005 revised curriculum for Grade 5 call for additional conceptual development. For these expectations, this module provides a complete plan with detailed teaching notes, reproducible student pages, and a Step-by-Step master, all matching the instructional design of your core Teacher Guide and Student Book. **Curriculum Focus Lessons** are numbered in a logical unit flow: for example, Lesson 6.7A is designed to follow Lesson 6.7 and lead into Lesson 6.8.

Curriculum Focus Notes and **Curriculum Focus Lessons** follow in sequence, where relevant after the **Unit Planning Chart**.

Reproducible Masters, with Answers
You'll find reproducible masters provided for any expectation that requires such additional support. Answers for masters are provided with the teaching notes.

Curriculum Correlation
Go to page 64 to find detailed curriculum correlation that demonstrates where each expectation from your grade 5 curriculum is addressed in ***Addison Wesley Math Makes Sense 5***.

What's New at Grade 5?

Unit	Curriculum Focus Notes	Curriculum Focus Lesson Masters
2	2.1: Representing, Comparing, and Ordering Numbers	
	2.10: Multiplying 2-Digit Numbers	
	2.12: Dividing with Whole Numbers	
	2.13: Solving Problems	
3	3.2: Measuring and Constructing Angles	
	3.6: Making Nets	
4	4.1: Tenths and Hundredths	
	4.8: Multiplying Decimals by 10 and 100	
	4.9: Dividing Decimals by 10	
5	5.2: Mean and Mode	
	5.3: Drawing Bar Graphs	
	5.4: Line Graphs	
		Lesson 5.4A: Related Data
6		Lesson 6.1A: The 24-hour Clock
		Lesson 6.1B: Elapsed Time
		Lesson 6.7A: Volume of a Rectangular Prism
7	7.1: Coordinate Systems	
	7.2: Transformations	
8	8.4: Relating Fractions to Decimals	
9	9.2: Relating Units of Measure	
10	10.1: Patterns in Multiplication	
		Lesson 10.1A: Multiplicative Relationships
	10.3: Graphing Patterns	

Unit 1 Number Patterns

Lesson	Curriculum Coverage	Lesson Masters and Materials
Cross-Strand Investigation: Building Castles	Optional, but recommended	
Lesson 1: Number Patterns and Pattern Rules	Required	
Lesson 2: Creating Number Patterns	Required	
Lesson 3: Modelling Patterns	Required	
Lesson 4: Using Patterns to Solve Problems	Required	
Lesson 5: Strategies Toolkit	Required	
Unit Problem: Charity Fundraising	Optional, but recommended	

Cross-Strand Investigation: Although this material is not directly required by the Grade 5 curriculum, this investigation allows students to connect their knowledge from several math strands to the real world. It also serves as a valuable instructional tool for activating students' prior learning before they start on a new program of study in Grade 5.

Unit Problem: Although this material is not directly required by the Grade 5 curriculum, the material is recommended as a review of the different patterns in this Unit.

Unit 2 Whole Numbers

Lesson	Curriculum Coverage	Lesson Masters and Materials
Lesson 1: Representing, Comparing, and Ordering Numbers	Required: see Focus Note 2.1	PM Master 16, PM Master 20
Lesson 2: Using Mental Math to Add	Required	
Lesson 3: Adding 3- and 4-Digit Numbers	Optional	
Lesson 4: Adding Three Numbers	Required	
Lesson 5: Using Mental Math to Subtract	Required	
Lesson 6: Subtracting with 4-Digit Numbers	Optional	
Lesson 7: Multiplication and Division Facts to 144	Optional, but recommended	
World of Work: Banquet Coordinator	Optional	
Game: Multiplication Tic-Tac-Toe	Optional	
Lesson 8: Multiplying with Multiples of 10	Optional	
Lesson 9: Using Mental Math to Multiply	Required	
Lesson 10: Multiplying 2-Digit Numbers	Required: see Focus Note 2.10	
Lesson 11: Estimating Quotients	Required	
Lesson 12: Dividing with Whole Numbers	Required: see Focus Note 2.12	
Lesson 13: Solving Problems	Required: see Focus Note 2.13	Master 2.36
Game: Less is More	Optional	
Lesson 14: Strategies Toolkit	Optional, but recommended	
Unit Problem: On the Dairy Farm	Optional, but recommended	

Lesson 7: While multiplication of whole numbers is required by the Grade 5 curriculum, this lesson serves as a review of basic multiplication facts.

Lesson 14: Although this material is not directly required by the Grade 5 curriculum, the material is recommended for use as a review of strategies for problem solving.

Unit Problem: Although this material is not directly required by the Grade 5 curriculum, the material is recommended as a review of operations with whole numbers in this Unit.

2.1: Representing, Comparing, and Ordering Numbers

Focus Note 2.1

Curriculum expectations:

- Represent, compare, and order whole numbers and decimal numbers from 0.01 to 100 000, using a variety of tools.
- Demonstrate an understanding of place value in whole numbers and decimal numbers from 0.01 to 100 000, using a variety of tools and strategies.

Student material: PM Master 16, PM Master 20

Curriculum Focus

The curriculum requires that students represent, compare, and order 4- and 5-digit whole numbers, using a variety of tools.

Extend *Practice*. Use these questions for more practice on representing, comparing, and ordering 4- and 5-digit whole numbers. Suggest students use number lines (PM Master 16) or 5-column charts (PM Master 20) to help with ordering numbers. Make master copies for the class.

7. Write each number in standard form.

a) 3000 + 700 + 30 + 4 (*Answer: 3734*)

b) 40 000 + 600 + 90 (*Answer: 40 690*)

c) 6000 + 4 (*Answer: 6004*)

d) 90 000 + 8000 + 10 (*Answer: 98 010*)

8. Write each number in expanded form.

a) 4218 (*Answer: 4000 + 200 + 10 + 8*)

b) 60 563 (*Answer: 60 000 + 500 + 60 + 3*)

c) 79 102 (*Answer: 70 000 + 9000 + 100 + 2*)

9. Describe the Base Ten blocks you would need to represent 76 892.
(*Answer: I would need 7 ten thousand blocks, 6 thousand cubes, 8 flats, 9 rods, and 2 unit cubes.*)

10. Use a number line to compare these 2 numbers: 28 183 and 23 188
Which number is smaller? Why?
(*Answer: 23 188 is smaller because it is on the left of 28 183 on the number line.*)

11. Write the numbers from least to greatest.

a) 4862, 4812, 4873 (*Answer: 4812, 4862, 4873*)

b) 75 468, 71 651, 67 560 (*Answer: 67 560, 71 651, 75 468*)

c) 21 435, 24 138, 14 237 (*Answer: 14 237, 21 435, 24 138*)

2.10: Multiplying 2-Digit Numbers

Focus Note 2.10

Curriculum expectation:
Multiply two-digit whole numbers by two-digit whole numbers, using estimation, student-generated algorithms, and standard algorithms.

Curriculum Focus

The curriculum requires that students use different strategies to multiply 2-digit numbers.

Students should use strategies such as rounding or front-end estimation before making multiplication calculations. Students can use these strategies to check their answers for reasonableness. For example, the product of *Practice* question 2, part d should be about 2800 (40 × 70 = 2800) by rounding. An answer, say, around 1000 would not be reasonable.

Ensure student understand that when an exact answer is not required, an estimate is sufficient. For example, to find the number of pages of a book you could read in 12 h at an average reading rate of 11 pages per hour, an estimate of 10 × 10 = 100 (pages) is sufficient.

2.12: Dividing with Whole Numbers

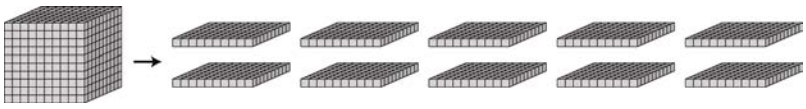
Focus Note 2.12

Curriculum expectation:
Divide three-digit whole numbers by one-digit whole numbers, using concrete materials, estimation, student-generated algorithms, and standard algorithms.

Curriculum Focus

The curriculum requires that students understand how to use concrete materials when dividing with whole numbers.

Show students this method of dividing with whole numbers: 1127 ÷ 5



The quotient is:  remainder is  , or 225 R2

2.13: Solving Problems

Focus Note 2.13

Curriculum expectation:
Solve problems that arise from real-life situations and that relate to the magnitude of whole numbers up to 100 000.

Student material: Master 2.36

Curriculum Focus

The curriculum requires that students solve problems that arise from real-life situations involving whole numbers up to 100 000.

Have students complete Master 2.36, Problems with Whole Numbers up to 100 000.

Answers to Master 2.36:

1. 72 300 seats **2.** $21 551 **3.** 35 trips **4.** 380 packs; $570 **5.** 2496 km; $998.40

Name:_____ Date:_____

Master 2.36

Problems with Whole Numbers up to 100 000

1. There are 70 000 seats in the lower deck of a stadium and 2000 seats in the upper deck.
There are another 300 seats in the luxury boxes.
How many seats are there in all?

2. In the first month of operation, a restaurant made $8765.
In the second month, it made $7946.
In the third month, it made $3925 less than it made in the first month.
How much in total did the restaurant make in the first 3 months?

3. There are about 21 000 school children in a city.
Twenty-four buses are arranged to take them for a 1-day field trip.
Each bus can take 25 children at one time.
How many trips does each bus have to make?

4. A grocery store has a sale on apples.
You get a free apple when you buy a pack of 6 apples.
The store has 2660 apples. How many packs of 6 apples can it sell?
If each apple costs 25¢, how much money will the store make?

5. Two people in a family share a car.
The average distance travelled by each person is 24 km per week.
About how many kilometres will be travelled in a year by this family?
For 1 km, it costs 40¢ for gas and car maintenance.
How much does the family spend on gas and car maintenance in a year?

Unit 3 Geometry

Lesson	Curriculum Coverage	Lesson Masters and Materials
Lesson 1: Naming and Sorting Polygons by Sides	Required	
Lesson 2: Measuring and Constructing Angles	Required: see Focus Note 3.2	
Lesson 3: Strategies Toolkit	Optional, but recommended	
Lesson 4: Naming and Sorting Polygons by Angles	Required	
Lesson 5: Constructing Triangles	Required	
Lesson 6: Making Nets	Required: see Focus Note 3.6	Master 3.25
Technology: Using a Computer to Explore Nets	Required	
Game: What's My Rule?	Optional	
Unit Problem: Bridges	Optional, but recommended	
Cross Strand Investigation: Triangle, Triangle, Triangle	Optional, but recommended	

Lesson 3: Although this material is not directly required by the Grade 5 curriculum, the material is recommended as a review of strategies for problem solving.

Unit Problem: Although this material is not directly required by the Grade 5 curriculum, the material is recommended as a review of types of angles and two- and three-dimensional figures in this Unit.

Cross-Strand Investigation: Although this material is not directly required by the Grade 5 curriculum, this investigation allows students to connect their knowledge from several math strands to the real world.

3.2: Measuring and Constructing Angles

Focus Note 3.2

Curriculum expectation:
Identify and classify acute, right, obtuse, and straight angles.

Curriculum Focus

The curriculum requires that students identify and classify acute, right, obtuse, and straight angles.

Include the size of a straight angle in *Connect* to read:

The measure of a **straight angle** is 180°.

Practice question 4 provides the opportunity for students to classify a straight angle. Ensure students classify the angle in part e as a straight angle.

3.6: Making Nets

Focus Note 3.6

Curriculum expectation:
Distinguish among prisms, right prisms, pyramids, and other three-dimensional figures.

Curriculum Focus

The curriculum requires students to distinguish between a right prism and a non-right prism.

Provide this definition of a right prism to students:

A **right prism** is a solid with two congruent and parallel bases that are polygons and other faces that are rectangles.

Have students complete Master 3.25, Identifying Right Prisms. You may have students copy the nets and make the solids to check.

Answers to Master 3.25:

1. **a)** congruent; polygons **b)** congruent; polygons; rectangles
2. **a)** Yes; 2 congruent square bases, with all 4 other faces that are rectangles (squares).
   b) Yes; 2 congruent rectangular bases, with 4 other faces that are rectangles.
   c) No; 2 congruent triangular bases, but with 3 parallelogram faces.
   d) No; 2 congruent rectangular bases, but with 4 parallelogram faces.
   e) Yes; 2 congruent trapezoidal bases, with 4 other faces that are rectangles.
   f) Yes; 2 congruent triangular bases, with 3 other faces that are rectangles.

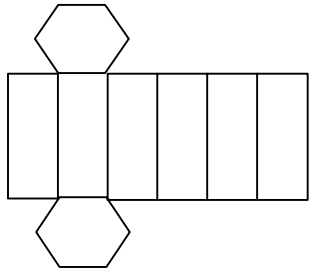
Name:_____ Date:_____

Master 3.25

Identifying Right Prisms

1. This is the net of a **right prism**.
Complete each sentence using these words.

congruent, polygons, rectangles

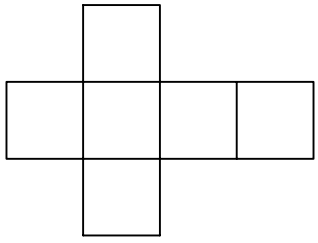


a) A prism has two _____ bases that are _____.

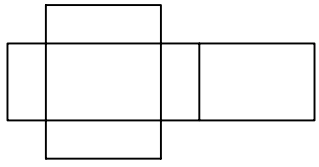
b) A right prism has two _____ bases that are _____ and all other faces that are _____.

2. Is the solid made by each net a right prism? Explain.

a)



b)



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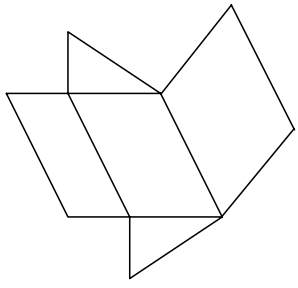
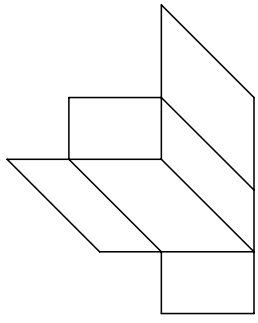
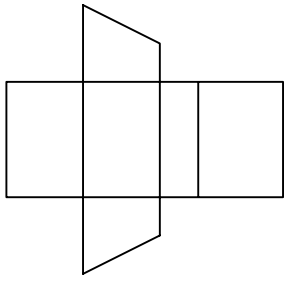


d)



e)



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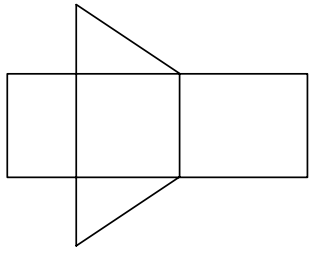


Unit 4 Decimals

Lesson	Curriculum Coverage	Lesson Masters and Materials
Lesson 1: Tenths and Hundredths	Required: see Focus Note 4.1	
Lesson 2: Equivalent Decimals	Optional, but recommended	
Lesson 3: Comparing and Ordering Decimals	Required	
Lesson 4: Rounding Decimals	Required	
Lesson 5: Estimating Sums and Differences	Optional	
Lesson 6: Adding Decimals	Required	
Game: Make 2!	Optional	
Game: Spinning Decimals	Optional	
Lesson 7: Subtracting Decimals	Required	
Lesson 8: Multiplying Decimals by 10 and 100	Required: see Focus Note 4.8	
Lesson 9: Dividing Decimals by 10	Required: see Focus Note 4.9	
Lesson 10: Strategies Toolkit	Optional, but recommended	
Unit Problem: Coins Up Close	Optional, but recommended	

Lesson 2: While comparing and ordering decimals is required by the Grade 5 curriculum, this lesson serves as a valuable introduction to the concept of comparing decimals.

Lesson 10: Although this material is not directly required by the Grade 5 curriculum, the material is recommended as a review of strategies for problem solving.

Unit Problem: Although this material is not directly required by the Grade 5 curriculum, the material is recommended as a review of operations with decimals in this Unit.

4.1: Tenths and Hundredths

Focus Note 4.1

Curriculum expectation:
Count forward by hundredths from any decimal number expressed to two decimal places, using concrete materials and number lines.

Curriculum Focus

The curriculum requires that students count by hundredths using concrete materials.

Extend *Explore* to include counting by hundredths while modelling each number using Base Ten Blocks.

For example, have students place unit cubes and count as the cubes are placed. For the mass of the penny between 2000–2003, students place 2 flats, 3 rods, and start counting as they place each of the 5 unit cubes, “Two and thirty-one hundredths, two and thirty-two hundredths, two and thirty-three hundredths, two and thirty-four hundredths, two and thirty-five hundredths.”

4.8: Multiplying Decimals by 10 and 100

Focus Note 4.8

Curriculum expectation:
Multiply decimal numbers by 10, 100, 1000, and 10 000, and divide decimal numbers by 10 and 100, using mental strategies.

Curriculum Focus

The curriculum requires students to multiply decimals by 10, 100, 1000, and 10 000.

Extend the lesson by including 1000 and 10 000 as factors.

Extend *Explore*. Have students record the products of the first factors multiplied by 1000, and by 10 000 in their place-value chart.

Extend *Show and Share*. Have student answer similar questions on how they can mentally multiply a decimal by 1000 and by 10 000.

Extend *Connect*. Discuss with students where they should place the decimal point when they multiply by 1000 and by 10 000. Ensure they know that the decimal point is moved 3 places to the right when multiplying by 1000, and is moved 4 places to the right when multiplying by 10 000.

Extend *Practice*. Use these questions for practice on multiplying decimals by 1000 and 10 000.

2. Use mental math to multiply.

a)	**b)**	**c)**	**d)**
4.7 × 1000	62.8 × 1000	3.85 × 1000	17.45 × 1000
4.7 × 10 000	62.8 × 10 000	3.85 × 10 000	17.45 × 10 000
(*Ans: 4700; 47 000*	*62 800; 628 000*	*3850; 38 500*	*17 450; 174 500)*

Use mental math to solve each problem.

8. The mass of a baby is 3.85 kg.
- **a)** How could you find the baby's mass in grams? (*Answer: Multiply 3.85 by 1000.*)
- **b)** How many grams is the baby? (*Answer: 3850 g*)

9. A charity organization plans to sell 10 000 raffle tickets for fundraising. Each ticket is $3.88. How much money will the organization raise if all tickets are sold? (*Answer: $38 800*)

4.9: Dividing Decimals by 10

Focus Note 4.9

Curriculum expectation:
Multiply decimal numbers by 10, 100, 1000, and 10 000, and divide decimal numbers by 10 and 100, using mental strategies.

Curriculum Focus

The curriculum requires students to divide decimal numbers by 10 and 100.

Extend the lesson by including 100 as a divisor.

Extend *Explore*. Have students record also the quotients of all the dividends divided by 100 in their place-value chart.

Extend *Show and Share*. Have student answer a similar question on how they can mentally divide a decimal by 100.

Extend *Connect*. Discuss with students where they should place the decimal point when they divide by 100. Ensure they know that the decimal point in the answer is 2 places to the left of its original position.

Extend *Practice*.

7. Use mental math to divide.

a) 185.3 ÷ 100 **b)** 25.3 ÷ 100 **c)** 8.2 ÷ 100 **d)** 0.9 ÷ 100

(*Answers: 1.853 0.253 0.082 0.009)*

Use mental math to solve each problem.

8. Lucy has 294 pennies in her jar.
How much is this in dollars? (*Answer: $2.94*)

9. The thickness of a pile of 100 loonies is 17.5 cm.
What is the thickness of a loonie in centimetres? (*Answer: 0.175 cm*)

Unit 5 Data Management

Lesson	Curriculum Coverage	Lesson Masters and Materials
Lesson 1: Interpreting Data	Required	
Lesson 2: Mean and Mode	Required: See Focus Note 5.2	
Technology: Creating Spreadsheets Using *AppleWorks*	Required	
Lesson 3: Drawing Bar Graphs	Required: See Focus Note 5.3	
Technology: Drawing Circle Graphs and Bar Graphs Using *AppleWorks*	Required	
Lesson 4: Line Graphs	Required: See Focus Note 5.4	
Lesson 4A: Related Data **Curriculum expectation:** Compare similarities and differences between two related sets of data, using a variety of strategies.	Required	Masters 5.25 to 5.27, Master 5.28: Step-by Step 4A
Technology: Drawing Line Graphs Using *AppleWorks*	Required	
Lesson 5: Interpreting Survey Results	Required	
World of Work: Medical Researcher	Optional	
Lesson 6: Bias in Displaying Data	Optional	
Lesson 7: Strategies Toolkit	Optional, but recommended	
Unit Problem: In the Lab	Required	

Lesson 7: Although this material is not directly required by the Grade 5 curriculum, the material is recommended as a review of strategies for problem solving.

5.2: Mean and Mode

Focus Note 5.2

Curriculum expectation:
Calculate the mean for a small set of data and use it to describe the shape of the data set across its range of values, using charts, tables, and graphs.

Curriculum Focus

The curriculum requires that students use the mean to describe the shape of a data set.

Extend *Explore* and *Connect*. Have students describe each set of data around the mean using sentences such as: “Most data values are less than the mean, but one value is much greater than the mean.” and “The set of data is not spread out evenly around the mean.”

Extend *Practice*. You may have students use the mean from a *Practice* question to describe the shape of the data set across its range of values.

Here are suggestions to describe the data sets in *Practice* question 1 using the mean:

1. a) The data values spread out evenly around the mean.
b) Two of the data values are the mean, 2 values are below, and 1 value is above.
c) One data value is much greater than the mean.

5.3: Drawing Bar Graphs

Focus Note 5.3

Curriculum expectations:

- Distinguish between discrete data (i.e., data organized using numbers that have gaps between them, such as whole numbers, and often used to represent a count, such as the number of times a word is used) and continuous data (i.e., data organized using all numbers on a number line that fall within the range of the data, and used to represent measurements such as heights or ages of trees).
- Describe, through investigation, how a set of data is collected and explain whether the collection method is appropriate.

Curriculum Focus

The curriculum requires that students understand the difference between discrete and continuous data, and that students describe and analyze their data collection methods.

Introduce students to the terms “discrete” and “continuous” used to describe data:
“**Discrete data**” describes data sets that have values that can be counted.
”**Continuous data**” describes data sets that include all values between two fixed values.

Ensure students understand that the data collected in *Explore* are discrete data, and that all data sets in this lesson contain discrete data. Use the data sets of distance against time in *Explore* and *Connect* in Unit 6, Lesson 2 to explain continuous data.

Have students identify the data collection method in *Explore* (*measurement*). They should discuss to find out why the measurement data might vary from group to group.

Also, have students identify the data collection methods (survey by asking, by telephoning, or by questionnaires, look up statistics on the Internet, etc.) in Lessons 4 and 5. Then, they discuss and explain if each collection method is appropriate for the data.

5.4: Line Graphs

Focus Note 5.4

Curriculum expectations:
Measure and record temperatures to determine and represent temperature changes over time.

Curriculum Focus

The curriculum requires that students measure and record temperatures.

Students should work in a group.

Have students read the temperatures from a thermometer outside the classroom window at half-hour intervals and record the temperatures in a table. Then they draw a line graph of the data by following the instructions in *Connect*.

Using the line graph, students write 4 questions they can answer from the graph.

Invite students to share their graphs and questions. Have students trade questions with another group and answer the 4 questions for their graph.

LESSON 5.4A

Related Data

Curriculum expectation: Compare similarities and differences between two related sets of data, using a variety of strategies.

SECTION ORGANIZER 40–50 min

Curriculum Focus: Compare 2 related sets of data by displaying the data, determining measures of central tendency, and describing the shape across the range of values.

Student Materials *Optional*
- Masters 5.25, 5.26, 5.27
- Step-by-Step 4A (Master 5.28)

Assessment: Master 5.2 Ongoing Observations: Data Management

Key Math Learnings

1. Related data can be compared using different displays.
2. Data sets can be compared using measures of central tendency, or by the shape of the data set across its range of values.

BEFORE — Get Started

Review with students the different methods of displaying data such as tally charts, stem-and-leaf plots, bar graphs, and line graphs.

Present *Explore*. Ensure that there are not more than 5 different answers to each survey question for ease of graphing the data. Student can use "Others" to group uncommon answers, such as weightlifting or archery for sports, to make fewer entries for each set of data.

DURING — Explore

Ongoing Assessment: Observe and Listen

Ask these questions before the class survey:

- How can you survey everyone in the class efficiently? (*Have each group send 1 person to each of other groups to ask the survey question. The remaining students will then answer the survey questions of the other groups. Or, have each group write their survey question on paper and hang it up in the classroom for all students to answer.*)
- How can you verify that you have surveyed everyone? (*The total tally marks should equal the number of students in the class.*)

Sample Answers

1. a) i) F ii) T iii) F iv) T
b) Both teams shot more than 50% at some point during the game. The shooting percent of the Bulldogs is increasing while the shooting percent of the Tigers is decreasing over the course of the game.

2. a) Boys: mean = 146.1 cm, median = 147.5 cm
Girls: mean = 138.9 cm, median = 139.5 cm
b) Boys: the data set spreads evenly around the mean.
Girls: the data set also spreads evenly around the mean.
c) The boys in the class are generally taller than the girls, by at least 5 cm.

3. a) Toronto: 12ºC, Melborne: 19.5ºC
Toronto is colder.
b) Question: What are the summer months in Toronto and Melborne?
Answer: In Toronto, they are July and August and in Melborne, they are January and February.
Question: During which months do the 2 cities have similar average high temperatures?
Answer: in May and in September

4. a) Grade 5: week of Oct 29;
Grade 6: week of Oct 1
b) There are more students in Grade 5 than in Grade 6.

REFLECT: No; For example, the data sets [1, 3, 5] and [2, 3, 4] both have 3 as the mean and the median, but the 2 sets of data are not the same.

AFTER — Connect

Encourage groups to share their graphs and answer the questions. Have the class suggest other similarities and differences between the 2 sets of data that they can see on each graph. Ask students to brainstorm more appropriate ways of displaying the data sets that would make comparisons easier.

Practice

Assessment Focus: Question 3

Remind students that they have to order the data from least to greatest in order to find the median of a set of data. The median can be more representative of a set of data than the mean when there are outliers in the data.

REACHING ALL LEARNERS

Alternative Explore

Use the same survey question to do the class survey. Have each group display the same 2 sets of data using a different method of display —a back-to-back stem-and-leaf plot, a double bar graph, a double line graph, for example. Have students look at the different displays and discuss what comparisons stand out as a result of the different methods used.

Common Misconception

- Students may have problems reading a back-to-back stem-and-leaf plot.

How to Help: Ask students to keep in mind that in this type of plot, data are always read using the stem as the first digit(s). When students read the set of the data on the left of the plot, they should always read the stem in the middle and then the leaf on the leftmost of each row. Have students use their finger to point to the stem column every time they read a number from the plot.

ASSESSMENT FOR LEARNING

What to Look For	What to Do
Knowledge and Understanding √ Students can compare the similarities and differences between two sets of related data. ***Communication*** √ Students can use different displays and measures of central tendency to describe the differences and similarities between two sets of related data. ***Application*** √ Students can use displays and measures of central tendency to identify similarities and differences in two related sets of data.	***Extra Support:*** Students can use Step-by-Step 4A (Master 5.28) to complete question 3. ***Extra Practice*:** Have students conduct a class survey on an issue that is important to the students and/or community. Have students prepare displays and write comparisons of the data from two related groups that will be helpful in understanding the issue. ***Extension:*** Gather the same statistics for 2 different teams of a sporting event. Have students organize and analyze the data.

Recording and Reporting
Master 5.2 Ongoing Observations: Data Management

Name:_____ Date:_____

Master 5.25

5.4A Related Data

Explore

Work in a group.

- Conduct a class survey using one of these questions:
  "What is your favourite sport?"
  "How did you come to school this morning?"
  "What type of pet do you have at home?"
- Record your results in this chart.
- Graph the 2 sets of data, one for boys and one for girls, on the same graph of your choice.
- Look at the 2 sets of data on the graph. How are they similar? How are they different?

Answer to Question	Boys	Girls

Show *and* Share

What graph did you use to display the data?
Exchange your graph with another group. Have them answer these questions:
How are the 2 sets of data similar? How are they different?

Connect

To compare 2 sets of related data, choose an appropriate data display.

- Consider these 2 data displays that show the number of points scored in 5 basketball games between 2 teams, A and B.

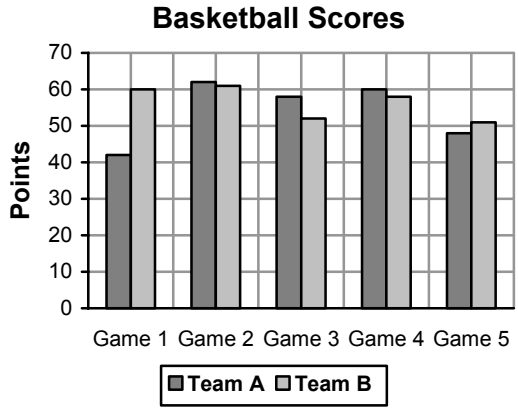
Back-to-back Stem-and-Leaf Plot

Basketball Scores

Leaf (Team A)	Stem	Leaf (Team B)
2 8	4	
8	5	1 2 8
0 2	6	0 1

2 | 4 means 42 5 | 1 means 51

Double Bar Graph



Name:_____ Date:_____

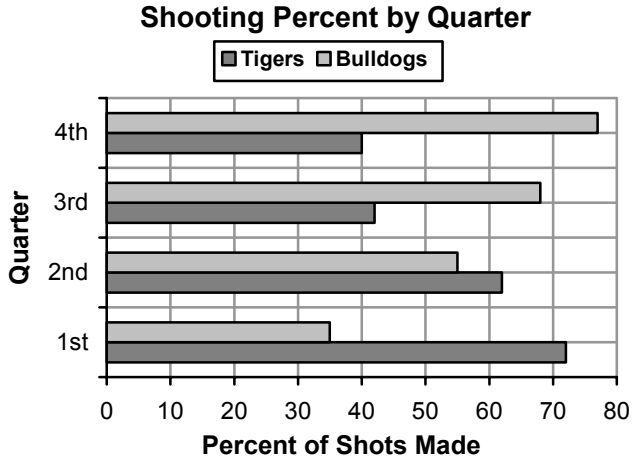
Master 5.26

Lesson 5.4A Continued

- The 2 teams show a big difference in their range of scores.
  Team A: 62 – 42 = 20
  Team B: 61 – 51 = 10
  Team A has scores spread across a wider range of values than Team B.
  From the stem-and-leaf plot, Team B shows a steadier performance.
- The 2 teams have similar mean scores.
  Team A: mean = $\frac{42 + 48 + 58 + 60 + 62}{5}$ = 54
  Team B: mean = $\frac{51 + 52 + 58 + 60 + 61}{5}$ = 56.4
  The mean scores of both teams are greater than 50 points.
  From the double bar graph, both teams can likely score around 50 points or more for each game they play against each other.

Practice

1. The double bar graph displays the shooting percent of 2 teams in a basketball game by quarter.



a) Use the graph. Write each statement as True (T) or False (F).
- **i)** The Tigers are improving their shooting over the course of the game.
- **ii)** The Bulldogs are improving their shooting over the course of the game
- **iii)** Both teams shot less than 50% at some point during the game.
- **iv)** Both teams shot more than 50% at some point during the game.

b) Use the graph. How are the data sets different? Similar?

Name:_____ Date:_____

Master 5.27

Lesson 5.4A Continued

2. The stem-and-leaf plot shows the heights of 20 students in a class.

Heights of Students (cm)

Leaf (Boys)	Stem	Leaf (Girls)
9	12	0 6
3 5	13	1 5 7
2 7 8	14	2 3
4 6 7	15	0 2 3
0	16	

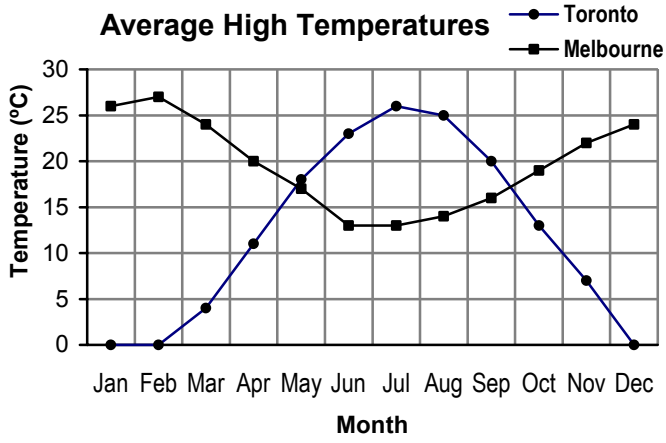
a) Find the mean and median of each set of data for boys and for girls.

b) Use the mean.
Describe the shape of each set of data across its range of values.

c) Use the median.
How are the heights of boys compared with the heights of girls?

3. **Assessment Focus**

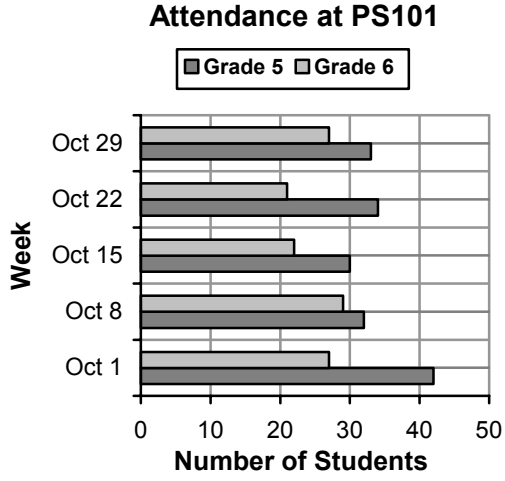
The line graph shows the average high temperatures of two cities.
Look at the graph.



a) Find the median temperature of each city.
Which city is colder?

b) Ask 2 questions that compare the 2 sets of temperatures.
Answer your questions.

4. The double graph shows the average attendance in a week for Grade 5 and Grade 6 students at PS101.



a) During which week does the median attendance occur for each grade?

b) Make a statement about the number of students in each of these 2 grades.

Reflect

Suppose 2 related sets of data have the same mean and median.
Is it correct to say that the 2 sets of data are the same? Explain.

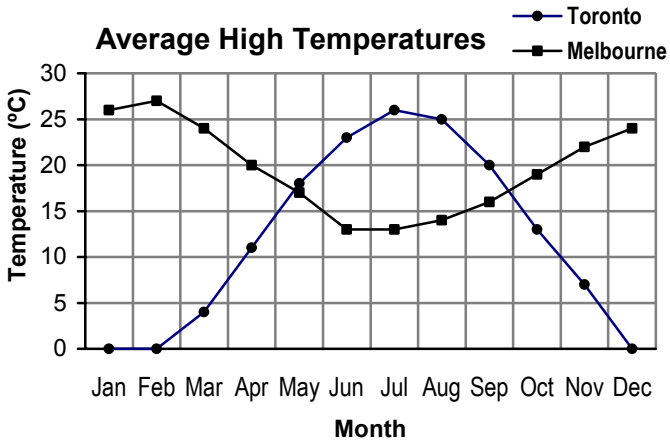
Name:_____ Date:_____

Master 5.28

Step-by-Step 4A

Lesson 5.4A, Question 3

Step 1 Look at the graph that shows the average high temperatures of 2 cities.



Find the lowest average high temperature of each city.

Toronto _____ Melborne _____

Step 2 From the lowest temperature, trace along the graph to find the 6th and 7th lowest temperatures for each city.

Toronto: 6th _____ 7th _____ Melborne: 6th _____ 7th _____

What is the median temperature of each set of temperatures?

Toronto _____ Melborne _____

Which city is colder? _____

Step 3 Look at the 2 hottest months of each city.
What question would you ask?

_____

Step 4 Look at the 2 intersecting points of the line graphs.
What question would you ask?

_____

Unit 6 Measurement

Lesson	Curriculum Coverage	Lesson Masters and Materials
Lesson 1: Measuring Time	Required	
Lesson 1A: The 24-hour Clock **Curriculum expectations:** Sole problems involving the relationship between a 12-h clock and a 24-h clock. Estimate and determine the elapsed time, with and without using a time line, given the durations of events expressed in minutes, hours, days, weeks, months, or years.	Required	Masters 6.28 to 6.29, Master 6.30: Step-by Step 1A
Lesson 1B: Elapsed Time **Curriculum expectation:** Estimate and determine the elapsed time, with and without using a time line, given the durations of events expressed in minutes, hours, days, weeks, months, or years.	Required	Masters 6.31 to 6.33, Master 6.34: Step-by Step 1B
Lesson 2: Exploring Time and Distance	Required	
Lesson 3: Strategies Toolkit	Required	
Lesson 4: Estimating and Counting Money	Required	
Lesson 5: Making Change	Optional	
Lesson 6: Capacity	Required	
Lesson 7: Volume	Required	
Lesson 7A: Volume of a Rectangular Prism **Curriculum expectation:** Develop, through investigation using stacked congruent rectangular layers of concrete material, the relationship between the height, the area of the base, and the volume of a rectangular prism, and generalize to develop the formula (i.e., *Volume = area of base x height*).	Required	Masters 6.35 to 6.37, Master 6.38: Step-by Step 7A, 1-cm interlocking cubes
Lesson 8: Relating Capacity and Volume	Required	
Lesson 9: Measuring Mass	Required	
Lesson 10: Exploring Large Masses	Required	
Unit Problem: All Aboard!	Optional, but recommended	

Unit Problem: Although this material is not directly required by the Grade 5 curriculum, the material is recommended as a review of the measurement concepts in this Unit.

LESSON 6.1A

The 24-Hour Clock

Curriculum expectations: Solve problems involving the relationship between a 12-hour clock and a 24-hour clock. Estimate and determine elapsed time, with or without using a time line, given the duration of events expressed in minutes, hours, days, weeks, months, or years.

SECTION ORGANIZER 40–50 min

Curriculum Focus: Relate times in 12-h notation to times in 24-h notation. Determine elapsed time using a 24-h clock.

Student Materials	*Optional*
■ Masters 6.28, 6.29	■ Step-by-Step 1A (Master 6.30)

Assessment: Master 6.2 Ongoing Observations: Measurement

Key Math Learnings

1. Time can be shown using a 12-h clock or a 24-h clock.
2. Four digits are used to write time in 24-h notation.

BEFORE — Get Started

Have students look at a watch or an analog clock in the classroom. Ask questions, such as:

- What time is shown on the clock? (*9:30*)
- Can you tell if this time is a.m. or p.m.? (*No*)
- How are times written to show that they are times in the morning, afternoon, or evening? (*Write a.m. and p.m. at the end, or write in the style we see on a digital clock.*)

Present *Explore*. Ask students to work out how to read the times in the conference schedule.

DURING — Explore

Ongoing Assessment: Observe and Listen

Ask questions, such as:

- How do you know which workshops are in the morning, afternoon, and evening? (*Times in the morning start with numbers between 0 and 11, times in the afternoon start with numbers between 12 and 17, and times in the evening start with numbers between 18 and 23.*)
- How long is Workshop 1? (*1 h 15 min*)
- What time is the first meal? (*6:30 p.m.*)

Sample Answers

1. a) 06:00
b) 12:00
c) 21:20
d) 00:40

2. a) 7:45 a.m.
b) 12:15 p.m.
c) 3:50 p.m.
d) 12:35 a.m.

3. Melissa should leave at 11:15 a.m.

4. 45 minutes

5. 7 hours and 45 minutes

6. a) The train arrives Stations A and B in the morning, and arrives Station C in the evening.
b) Station C
c) Station A
d) Station B and Station C

REFLECT: It is better to use 24-h clock to tell time in situations where a 12-h clock may cause confusion in a.m. or p.m. Examples would be bus and train schedules. The military also uses the 24-h clock.

AFTER — Connect

Invite students to share the methods they used to answer the questions in *Explore*, and to share their understanding of the 24-h clock notation. You may want to display a chart such as this one below on the board or overhead to help.

12-h notation	12:00 midnight	a.m.	12:00 noon	p.m.
24-h notation	00:00	hours 0 to 11	12:00	hours 12 to 23
Example		12:25 a.m. = 00:25		12:45 p.m. = 12:45

Practice

Assessment Focus: Question 6

Students should consider two time intervals, 21:45 to 00:00 and 00:00 to 2:15, and add them together to determine how long the train stays at Station C.

REACHING ALL LEARNERS

Early Finishers

Students can use the conference schedule to create time questions. They then trade questions with a partner and challenge the partner to answer their questions.

Common Misconception

- Students add 10 instead of 12 to convert p.m. times in 12-h notation to times in 24-h notation and subtract 10 instead of 12 vice versa.

How to Help: Have students draw a number line from 1 to 24. They write 1 to 12 above the numbers 1 to 12, and repeat writing 1 to 12 above the numbers 13 to 24. Encourage students to use this number line when converting times in 12-h notation to times in 24-h notation.

ASSESSMENT FOR LEARNING

What to Look For	What to Do
Knowledge and Understanding √ Students understand how time can be represented using the 24-h notation. ***Communication*** √ Students can explain how to solve problems related to times in 24-h notation. ***Application*** √ Students can read and write times in 24-h notation. √ Students can convert between times on a 12-h clock and times on a 24-h clock. √ Students can determine elapsed time.	***Extra Support:*** Students can use Step-by-Step 1A (Master 6.30) to complete question 6. ***Extra Practice*:** Have students use a watch to randomly set a time, and practice reading and writing this time in 12-h and 24-h notations. ***Extension:*** Students can record the starting and finishing times of their daily activities in 24-h notation, and calculate the duration of each activity.

Recording and Reporting
Master 6.2 Ongoing Observations: Measurement

LESSON 6.1B

Elapsed Time

Curriculum expectation: Estimate and determine elapsed time, with or without using a time line, given the duration of events expressed in minutes, hours, days, weeks, months, or years.

SECTION ORGANIZER 40–50 min

Curriculum Focus: Determine elapsed time given times in minutes, hours, days, weeks, months, and years.

Student Materials *Optional*

- Masters 6.31, 6.32, 6.33
- Step-by-Step 1B (Master 6.34)

Assessment: Master 6.2 Ongoing Observations: Measurement

Key Math Learnings

1. Elapsed time can be found by counting.
2. The starting time, the finishing time, or the duration of an event can be found given the other two times.
3. Elapsed time may be found using, or without using, a time line.

BEFORE Get Started

Have students read the article about the Olympic Games. Point out to them that there are references to time given in years, days, minutes, and seconds.

Present *Explore*. Observe students as they create displays of the information. Some may create a time line, while others may create a table.

DURING Explore

Ongoing Assessment: Observe and Listen

Ask questions, such as:

- Which fact uses years as the unit of time? (*The number of years between the two Olympics held at Athens*)
- Which fact uses days as the unit of time? (*The number of days the 2004 Olympics lasted*)
- Which fact uses seconds as the unit of time? (*The finishing time of the 1000-m kayak race*)

Guide students to the most appropriate way to find each elapsed time.

Sample Answers

1. a) 3 h 25 m
b) 231 days, or 33 weeks
c) about 27 months, or about 2 years 3 months, or 824 days
d) 291 min or 4 h 51 min
2. a) 6:20 p.m.
b) January 24, 2006
c) July 3, 2000
d) 104 min, or 1 h 44 min
e) July 5, 2003
f) 36 days, or about 5 weeks, or about 1 month 5 days
g) 8:15:49 a.m.
3. 6:10 p.m.
4. 77 days; 11 weeks
5. a) 12:25, 3:10, 6:40, 9:10, 11:55
b) 1 h 5 min
c) 4 h 10 min
d) 4:25 p.m.
6. 15 m 30 s

REFLECT: Student activities and answers may vary. Elapsed times of activities in a day are likely expressed in hours or minutes. For example, a movie is about 1 h 40 min long. Activities in a year have elapsed times expressed in months, weeks, or days. For example, the summer holiday is 2 months, or 8 weeks and 6 days.

AFTER — Connect

Invite students to share their displays of the time information and the strategies they used to determine the length of time between two events.

Show students how to find the elapsed time between two events on the time line.

Point out to students that occasionally, times, such as the show times in *Practice* question 5, are written in the 12-h notation without the use of a.m. and p.m. This happens when it is easily understood that the times written are in the morning, afternoon, or evening.

Practice

A calendar may be required for questions 1, 2, and 4.

Assessment Focus: Question 5

Some students may use a demonstration clock or draw analog clock faces to show time. They must calculate to find the time between the end of a show and the start of the next show because the break times are not always the same.

REACHING ALL LEARNERS

Alternative Explore
Provide students with a schedule such as a television schedule. Have students choose programs from the schedule and determine the elapsed time between the programs.

Early Finishers
Students list time facts of their own and draw a time line. They create problems about elapsed time between facts on the time line for other students to solve.

ASSESSMENT FOR LEARNING

What to Look For	What to Do
Knowledge and Understanding √ Students understand the concept of elapsed time. ***Communication*** √ Students can explain how to find elapsed time between two events. ***Application*** √ Students can calculate the elapsed time between two given events. √ Given the start time and the length of an activity, students can determine the end time. √ Given the end time and the length of an activity, students can determine the start time.	***Extra Support:*** Students can use Step-by-Step 1B (Master 6.34) to complete question 5. ***Extra Practice*:** Have students record the start and end times of activities throughout the day, and then find the elapsed time for each activity. ***Extension:*** Students use the sports page in their local paper. They can look at the box scores for baseball and football games to find the start time of a game and the duration of the game. They then calculate the end time of each game.

Recording and Reporting
Master 6.2 Ongoing Observations: Measurement

LESSON 6.7A

Volume of a Rectangular Prism

Curriculum expectation: Develop, through investigation using stacked congruent rectangular layers of concrete materials, the relationship between the height, the area of the base, and the volume of a rectangular prism, and generalize to develop the formula (i.e., *Volume = area of base × height*).

SECTION ORGANIZER 40–50 min

Curriculum Focus: Find the volume of a rectangular prism.

Student Materials *Optional*
- Masters 6.35, 6.36, 6.37
- 1-cm interlocking cubes
- Step-by-Step 7A (Master 6.38)

Assessment: Master 6.2 Ongoing Observations: Measurement

Key Math Learnings
1. The area of the base, the height, and the volume of a rectangular prism are related.
2. The volume of a rectangular prism equals the product of the area of the base and the height.

BEFORE — Get Started

Review the parts of a rectangular prism, including the base and the height.

Present *Explore*. Remind students that they may use any number of cubes to make form a rectangular prism.

DURING — Explore

Ongoing Assessment: Observe and Listen

Ask questions, such as:
- Can you make another rectangular prism with a different base that also has 3 layers of cubes? If yes, how? (*Yes, I can use 3 rows of 2 cubes for the base.*)
- Can you use 12 cubes to make a rectangular prism different from the one shown? Explain. (*Yes, I can use 1 row of 4 cubes as the base, and build 3 layers to form a different rectangular prism.*)

Sample Answers

1. a) 8 cm^3
b) 80 cm^3
c) 126 m^3

2. a) 22,400 cm^3
b) No

3. No. The rectangular prism will need 3 × 4 × 3, or 36 cubes to build.

4. a) Check students' drawings.
b) The volumes are equal because the 3 rectangular prisms use the same number of cubes.

5. The 6 cm by 5 cm by 4 cm prism has a greater volume. Its volume is 120 cm^3 whereas the volume of the other prism is 108 cm^3.

6. Use the formula for the volume of a rectangular prism:
Volume = area of base × height.
For the same volume, if the height of prism A is greater than the height of prism B, the area of the base of prism A must be less than the area of the base of prism B to give the same product.

7. a) 180 m^3
b) 90 m^3

REFLECT: Use the formula for the volume of a rectangular prism:
Volume = area of base × height.
If the heights are different, then the volumes will be different. So, the two rectangular prisms that have the same base area and volume must also have the same height.

AFTER — Connect

Help students make the connection between the area of the base of a rectangular prism and the number of cubes requires to build the base, and ultimately that the volume of a rectangular prism equals the product of the area of the base and the height.

Practice

Have centimetre cubes available for questions 3, 4, and 6.

Assessment Focus: Question 6

It may help students if they use centimetre cubes to model the problem. Suggest that they use 40 cubes, which have a volume of 40 cm^3 to make different prisms with different heights. Students then record their results in a table to find how the area of the base changes when the height of the rectangular prism becomes greater.

REACHING ALL LEARNERS

Alternative Explore

Materials: 1-cm interlocking cubes

Have students find all of the rectangular prisms that they can make using exactly 24 cubes. Use a table similar to the one in *Explore* to record and generalize the information.

Common Misconception

- Students may struggle to substitute the three dimensions of a rectangular prism (length, width, and height) into the formula for volume, $A \times h$, which has only two variables.

How to Help: Have students read the volume formula as "Volume equals *area of the base* times *height*", rather than "Volume equals *A* times *h*," to reinforce the meanings of the two variables.

ASSESSMENT FOR LEARNING

What to Look For	What to Do
Knowledge and Understanding √ Students understand the relationship between the area of the base, the height, and the volume of a rectangular prism, and generalize to develop a formula. ***Communication*** √ Students can compare different rectangular prisms and communicate how the differences impact the volume, height, or area of the base. ***Application*** √ Students can use the volume formula to calculate the volume of a rectangular prism.	***Extra Support:*** Students can use Step-by-Step 7A (Master 6.38) to complete question 6. ***Extra Practice*:** Return to *Explore*. Choose 3 of the rectangular prisms. Turn the prism to sit on its side. Check if the relationship still holds between the number of cubes in the base (area of base), the number of layers (height), and the number of cubes used (volume). ***Extension:*** Have students explore the relationship between similar rectangular prisms. For example, ask students to find how the volume changes when the dimensions of the prism are each doubled.

Recording and Reporting
Master 6.2 Ongoing Observations: Measurement

Name:_____ Date:_____

Master 6.28

6.1A The 24-Hour Clock

Explore

Work with a partner.

Roger and Jessica are attending a two-day conference. The schedule for the conference is shown.

Day 1 Meetings	
Opening Session	16:30
Workshop 1	17:15
Meal	18:30
Workshop 2	20:30
Day 1 Wrap-Up	21:00

Day 2 Meetings	
Day 1 Recap	08:45
Workshop 3	09:15
Workshop 4	10:30
Meal	12:00
Workshop 5	13:15
Workshop 6	16:00
Meal	17:15
Closing Session	19:00

- On the first day, is the first workshop held in the morning, in the afternoon, or in the evening? What about the one on the second day?
- Which meal of the day is the "Meal" on the first day? Which meals are those on the second day?
- Which workshop is the longest? Explain how you know.

Show *and* Share

Share your results with those of other classmates.
Compare the methods you used to find the time of the longest workshop.

Connect

When we use a 24-h clock, it is clear that a stated time is in the morning or in the afternoon.

There are 24 hours in one day.

- From midnight to noon, the hours are from 0 to 12.
- From 1 p.m. to 11 p.m., the hours are from 13 to 23.
  We add 12 to each hour to find its time on the 24-hour clock.
- Each time is written with 4 digits.

Look at the clocks below.

8:15 a.m. is written 08:15.
8:15 p.m. is written 20:15.

10:30 a.m. is written 10:30.
10:30 p.m. is written 22:30.

Name:_____ Date:_____

Master 6.29

Lesson 6.1A Continued

Practice

1. Write each time in 24-h notation.
a) 6:00 a.m. **b)** 12:00 noon **c)** 9:20 p.m. **d)** 12:40 a.m.

2. Each time is given in 24-h notation.
Write each time in 12-h notation. Use a.m. or p.m.
a) 07:45 **b)** 12:15 **c)** 15:50 **d)** 00:35

3. Melissa has to pick up her cousin at the airport at 13:15.
She lives 2 h away from the airport.
What time should Melissa leave home for the airport?
Will she leave in the a.m. or p.m.?

4. Shane's math class started at 12:30 and ended at 13:15.
How long was the class?

5. Stanley went to bed at 22:30 and woke up at 06:15.
How long did Stanley sleep?

6. **Assessment Focus** The table shows the train schedule for a three-station round route.

Station	Arrival	Departure
A	05:15	08:30
B	11:45	13:00
C	21:45	02:15

a) At which station does the train arrive in the morning? In the afternoon? In the evening?
b) At which station is the train at midnight?
c) At which station does the train stay for the longest time?
d) Between which two stations does the train take the longest time to travel?

Reflect

When is it better to use the 24-h clock instead of the 12-h clock? Include examples in you explanation.

Name:_____ Date:_____

Master 6.30

Step-by-Step 1A

Lesson 6.1A, Question 6

Step 1 Write the arrival time at each station in 12-h notation.
State what time of the day (morning, afternoon, or evening) each arrival time is.

Station A _____ Time in the _____

Station B _____ Time in the _____

Station C _____ Time in the _____

Step 2 What time in the 24-h notation is midnight? _____

Between which two times on the schedule is midnight?

_____ and _____

Step 3 How long does the train stay at Station A? _____

How long does the train stay at Station B? _____

How long does the train stay at Station C? _____

At which station does the train stay the longest?

_____

Step 4 How long does the train take to go from one station to the other?

Station A to Station B _____

Station B to Station C _____

Station C to Station A _____

Between which two stations does the train take the longest time to travel?

_____ and _____

Name:_____ Date:_____

Master 6.31

6.1B Elapsed Time

Explore

Read the article below:

> The Olympic Games are a series of events that athletes from around the world participate. In 2004, the Summer Olympics were held in Athens, Greece — the same host for the first modern Olympic Games in 1896.
>
> In 2004, the opening ceremony of the Summer Olympics was held on August 13, and the closing ceremony on August 29.
>
> On Friday, August 27, 2004, Canadian kayaker Adam van Koeverden won the bronze medal (third place) in the 1000-m kayak event. His finishing time was 3 minutes 28 seconds. The gold medalist (first place winner) of this event finished in 3 minutes 25 seconds.

Work with a partner.

Make a display showing all times given in the article.

- How much time passed between the two modern Olympic Games that were held in Athens?
- How long were the 2004 Olympics?
- How much time passed from the moment the gold medalist finished the race to the moment Adam van Koeverden crossed the finish line?

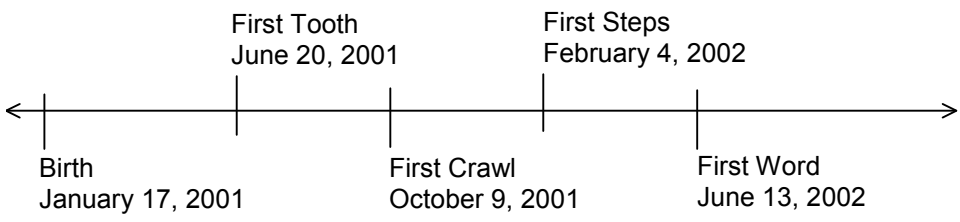
Show *and* Share

Share your results with another pair of students.
Explain how you found the answers to the questions.

Connect

You can use a time line to display events that occur over time.

Consider a time line for a child.



Name:_____ Date:_____

Master 6.32

Lesson 6.1B Continued

You can find the **elapsed time** between birth and the first tooth by counting.

- Start at January 17, 2001.
- Count the days to the beginning of the next month.
  There are 14 days to February 1.
- Count the months to the month when the first tooth came.
  There are 4 months to June 1.
- Count the days to the day when the first tooth came.
  There are 20 days to June 20.
- Add the times:
  14 days + 4 months + 20 days = 4 months and 34 days,
  or about 5 months and 4 days.

Note that this elapsed time is an estimate because some months have 30 days, some have 31 days, and February may have 28 days or 29 days.

Practice

1. Find each elapsed time.

a) between 1:53 p.m. and 5:18 p.m.

b) between March 9, 2005 and October 26, 2005

c) between April 30, 2004 and August 1, 2006

d) between 9:16 a.m. and 2:07 p.m.

2. Complete the table below.

	Time of Activity	Starting Time	Finishing Time
a)	8 h 4 min	10:16 a.m.	
b)	18 weeks	September 20, 2005	
c)	5 years and 4 months		November 3, 2005
d)		11:34 a.m.	1:18 p.m.
e)	7 days	June 28, 2003	
f)		December 11, 2002	January 16, 2003
g)	53 s		8:16:42 a.m.

Name:_____ Date:_____

Master 6.33

Lesson 6.1B Continued

3. Ken cooked a roast for 2 hours and 25 minutes.
He put the roast in the oven at 3:45 p.m.
What time did Ken take the roast out of the oven?

4. Brenda began reading a book on April 15, 2004.
She finished reading the book on July 1, 2004.
How many days did it take Brenda to read the book?
How many weeks?

5. **Assessment Focus** Use the movie schedule.
The movie is 1 h 25 min long.

The World of Math: *Starring Fred Fraction and Dottie Decimal*	
Date	**Show Time**
September 30, 2005	5:15, 7:45
October 1, 2005	11:00, 1:45, 5:15, 7:45, 10:30
October 2, 2005	11:00, 1:45, 5:15, 7:45

a) What time does each show on October 1 end?
b) On September 30, how long is the break between the 2 shows?
c) On October 1, how many minutes are there between the start of the first show and the end of the second show?
d) Patrick lives 50 min from the movie theatre.
He wants to see the third show on October 2.
By what time should Patrick leave home for the show?

6. Holly ran a race in 18 min 4 s.
She finished 2 min 34 s after Katie.
How long did it take Katie to run the race?

Reflect

Think of two activities you do in a day.
Find the elapsed time between the activities.
Think of two events you participate in a year.
Find the elapsed time between the events.

Name:_____ Date:_____

Master 6.34

Step-by-Step 1B

Lesson 6.1B, Question 5

Step 1 How long is each show? _____

Step 2 Write a.m. or p.m. for each show time on October 1.
Add you time in *Step 1* to find the ending times of the shows.

11:00 ( ) → _____ 1:45 ( ) → _____

5:15 ( ) → _____ 7:15 ( ) → _____

10:30 ( ) → _____

Step 3 On September 30, what time does the 5:15 show end?

Find your answer in *Step 2*. _____

Step 4 Subtract the ending time of the show in *Step 3* from 7:45.
On September 30, how long is the break between the 2 shows?

_____

Step 5 On October 1, what time does the first show start? _____

What time does the second show end?

Find your answer in *Step 2*. _____

How many minutes are there between the start of the first show and the end of the second show?

_____

Step 6 On October 2, what time does the third show start? _____

How long does it take to get to the movie theatre? _____

By what time should Patrick leave home for the show?

_____

Name:_____ Date:_____

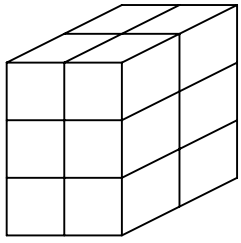
Master 6.35

6.7A Volume of a Rectangular Prism

Explore

Work in a group.
You will need interlocking cubes.

- Use the cubes to make a rectangular prism.
- In the table, record the number of cubes in one layer, the number of layers, and the total number of cubes in the rectangular prism.
- Make several different rectangular prisms and record the same information in the table.



Cubes in One Layer	Number of Layers	Total Number of Cubes
4	3	12

- Look at your results.
  Do you see a relationship between the number of cubes in one layer, the number of layers, and the total number of cubes used?
  What is your relationship?

Show *and* Share

Discuss your relationship with other groups of students.
Use your relationship to develop a formula for finding the volume of a rectangular prism.

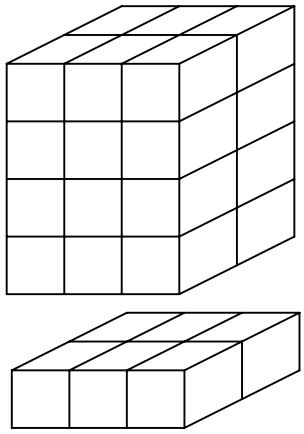
Name:_____ Date:_____

Master 6.36

Lesson 6.7A Continued

Connect

Each centimetre cube has a volume of 1 cm^3.
The number of cubes that form a rectangular prism gives the volume of the prism.



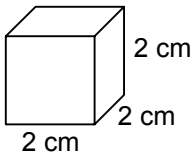
- This box has a base that measures 3 cm by 2 cm, and a height of 4 cm.
- To pack 1-cm cubes in the box, you use 3 × 2, or 6 cubes for the bottom layer.
- You need 4 layers to fill the box.
- So, altogether you use 6 × 4, or 24 cubes to fill the box.
  The volume of the box is 24 cm^3.

The volume of a rectangular prism is:
Volume = area of base × height

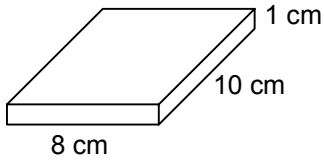
Practice

1. Find the volume of each rectangular prism.

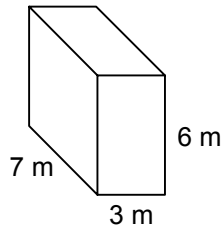
a)



b)



c)



2. Julia's fish tank is in the shape of a rectangular prism.
The base has an area of 800 cm^2 and the height is 28 cm.

a) Find the volume of Julia's fish tank.

b) A certain kind of fish requires a minimum volume of 25 000 cm^3.
Is Julia's fish tank large enough for this fish?

3. You have 27 centimetre cubes.
Can you make a rectangular prism with these dimensions?
Base: 3 cm × 4 cm Height: 3 cm
Explain your answer.

Name:_____ Date:_____

Master 6.37

Lesson 6.7A Continued

4. Use centimetre cubes.

a) Construct three different rectangular prisms with the same volume.
Sketch each prism you made.
Label each prism with its dimensions.

b) How do you know that the volumes are equal?

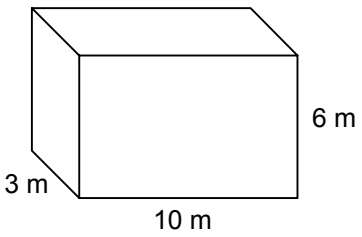
5. Which has a greater volume?

- a rectangular prism that is 6 cm by 5 cm by 4 cm, or
- a rectangular prism that is 18 cm by 3 cm by 2 cm?

How do you know?

6. **Assessment Focus** Each of two rectangular prisms has a volume of 40 cm^3.
The height of prism A is greater than the height of prism B.
Is the area of the base of prism A greater than or less than the area of the base of prism B?
How do you know?

7. **a)** Find the volume of this rectangular prism.



b) Suppose the prism is cut along one of its diagonals to make two triangular prisms.
What is the volume of each triangular prism?

Reflect

Suppose two rectangular prisms have the same base area.
Tell what you know about the heights of these rectangular prisms if both prisms have the same volume?
Explain using a formula.

Name:_____ Date:_____

Master 6.38

Step-by-Step 7A

Lesson 6.7A, Question 6

Step 1 What is the volume of 40 centimetre cubes?

_____

Step 2 Use 40 centimetre cubes each time.
Chose a height and build a rectangular prism.
Record your results in the table.
Change to a different height and build another rectangular prism.
Complete the table.

Number of Layers (Height)	Number of Cubes in One Layer (Area of Base)
1	40
2	
4	
5	
10	
20	

Step 3 From the table, if the height of prism A is greater than the height of prism B, how is the area of the base of prism A compare with the area of the base of prism B? Is it greater or smaller?

_____

_____

Unit 7 Transformational Geometry

Lesson	Curriculum Coverage	Lesson Masters and Materials
Lesson 1: Coordinate Systems	Required: see Focus Note 7.1	
Lesson 2: Transformations	Required: see Focus Note 7.2	
Lesson 3: Congruent Figures	Optional	
Technology: Using a Computer to Explore Congruent Figures	Optional	
Lesson 4: Line Symmetry	Optional	
Lesson 5 Strategies Toolkit	Optional, but recommended	
World of Work: Fashion Designer	Optional	
Lesson 6: Exploring Tiling	Required	
Unit Problem: Geometry in Art	Optional	
Cross Strand Investigation: Rep-Tiles	Optional	

Lesson 5: Although this material is not directly required by the Grade 5 curriculum, the material is recommended as a review of transformations in this Unit.

7.1: Coordinate Systems

Focus Note 7.1

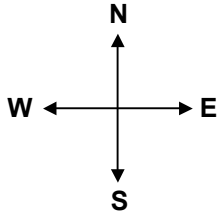
Curriculum expectations:

- Locate an object using the cardinal directions (i.e., north, south, east, west) and a coordinate system.
- Compare grid systems commonly used on maps (i.e., the use of numbers and letters to identify an area; the use of a coordinate system based on the cardinal directions to describe a specific location).

Curriculum Focus

The curriculum requires that students describe locations using cardinal directions (north, south, east, and west).

Show students this drawing of a compass rose:



Extend *Explore*. Have students describe one location with reference to another location using cardinal directions. For example, students may describe the location of the water ride in the amusement park as:
"The water ride is 2 units north and 4 units east of the swinging ship."

7.2: Transformations

Focus Note 7.2

Curriculum expectation:

Extend and create repeating patterns that result from translations, through investigation using a variety of tools.

Curriculum Focus

The curriculum requires that students know how to generate a repeating pattern using translations.

Extend *Explore*. Have students repeat the translation several times by using each image as the starting figure for the next translation. Explain that for each translation, the image drawn is a term in a repeating pattern.

Have students repeat 3 times the translation in *Practice* question 2a to form a repeating pattern.

Unit 8 Fractions and Decimals

Lesson	Curriculum Coverage	Lesson Masters and Materials
Lesson 1: Equivalent Fractions	Required	
Lesson 2: Fractions and Mixed Numbers	Required	
Lesson 3: Comparing and Ordering Fractions	Required	
Game: Order Up!	Optional	
Lesson 4: Relating Fractions to Decimals	Required: see Focus Note 8.4	
Lesson 5: Fraction and Decimal Benchmarks	Required	
Lesson 6: Relating Fractions to Division	Optional	
Technology: Fractions and Decimals on a Calculator	Optional	
Game: Fractions in Between	Optional	
Lesson 7: Estimating Products and Quotients	Optional	
Lesson 8: Multiplying Decimals with Tenths	Optional	
Lesson 9: Multiplying Decimals with Hundredths	Optional	
Lesson 10: Strategies Toolkit	Optional	
Lesson 11: Dividing Decimals with Tenths	Optional	
Lesson 12: Dividing Decimals with Hundredths	Optional	
Unit Problem: In the Garden	Optional, but recommended	

Unit Problem: Although this material is not directly required by the Grade 5 curriculum, the material is recommended as a review of fraction concepts in this Unit.

8.4: Relating Fractions to Decimals

Focus Note 8.4

Curriculum expectation:
Determine and explain, through investigation using concrete materials, drawings, and calculators, the relationship between fractions (i.e., with denominators of 2, 4, 5, 10, 20, 25, 50, and 100) and their equivalent decimal forms.

Curriculum Focus

The curriculum requires that students relate fractions with denominators of 2, 4, 5, 10, 20, 25, 50, and 100 to their equivalent decimals.

Extend *Practice*. Use these questions for practice on relating fractions with denominators of 25 and 50 to their equivalent decimals.

3. Use Base Ten Blocks to represent each fraction.
Then write each fraction as a decimal.

g) $\frac{4}{25}$ (*Answer: 0.16*) **h)** $\frac{19}{50}$ (*Answer: 0.38*)

4. Represent each fraction on a hundredths grid.
Then write each fraction as a decimal.

d) $\frac{11}{25}$ (*Answer: 0.44*) **e)** $\frac{29}{50}$ (*Answer: 0.58*)

Unit 9 Length, Perimeter, and Area

Lesson	Curriculum Coverage	Lesson Masters and Materials
Lesson 1: Measuring Linear Dimensions	Required	
Lesson 2: Relating Units of Measure	Required: see Focus Note 9.2	Master 9.28
Lesson 3: Using Non-Standard Units to Estimate Lengths	Optional	
Lesson 4: Measuring Distance Around a Circular Object	Optional	
Lesson 5: Using Grids to Find Perimeter and Area	Required	
Lesson 6: Measuring to Find Perimeter	Required	
Lesson 7: Calculating the Perimeter of a Rectangle	Required	
Lesson 8: Calculating the Area of a Rectangle	Required	
Lesson 9: Find the Area of an Irregular Polygon	Required	
Lesson 10: Estimating Area	Optional	
Lesson 11: Strategies Toolkit	Optional, but recommended	
Unit Problem: At the Zoo	Optional, but recommended	

Lesson 11: Although this material is not directly required by the Grade 5 curriculum, the material is recommended as a review of perimeter and area calculations in this Unit.

Unit Problem: Although this material is not directly required by the Grade 5 curriculum, the material is recommended as a review of perimeter and area concepts in this Unit.

9.2: Relating Units of Measure

Focus Note 9.2

Curriculum expectation:
Solve problems requiring conversion from metres to centimetres and from kilometres to metres.

Curriculum Focus

The curriculum requires that students solve problems requiring conversion from metres to centimetres and from kilometres to metres.

Have students complete Master 9.28, Relating Units of Length.

Answers to Master 9.28:

1. a) 100 **b)** 100 **c)** 1200 **d)** 40 000 **e)** 670 **f)** 2500 **g)** 58 **h)** 3920

2. 2800 cm **3.** 53 000 m **4.** 4200 m **5.** 470 cm **6.** 55 cm **7.** 350 000 m

Name:_____ Date:_____

Master 9.28

Relating Units of Length

1. Complete.

a) 1 m = _____ cm

b) 1 km = _____ m

c) 12 m = _____ cm

d) 40 km = _____ m

e) 6.7 m = _____ cm

f) 2.5 km = _____ m

g) 0.58 m = _____ cm

h) 3.92 km = _____ m

2. Isaiah needs 28 m of string for his art project.
How many centimetres of string does he need?

3. Michelle lives 53 km away from her grandmother.
How many metres away from her grandmother does Michael live?

4. Alex walked 4.2 km in the Walk-a-Thon.
How many metres did Alex walk?

5. The height of a giraffe is 4.7 m.
How many centimetres tall is the giraffe?

6. The diameter of a pipeline is 0.55 m.
What is the diameter of this pipeline in centimetres?

7. The distance between Ottawa and Toronto is about 350 km.
What is this distance in metres?

Unit 10 Patterns in Number and Geometry

Lesson	Curriculum Coverage	Lesson Masters and Materials
Lesson 1: Patterns in Multiplication	Required: see Focus Note 10.1	Master 10.22
Lesson 1A: Multiplicative Relationships **Curriculum expectations:** Describe multiplicative relationships between quantities by using simple fractions and decimals.	Required	Masters 10.23 to 10.24, Master 10.25: Step-by Step 1A, 4 numbered cards labelled 2, 4, 6, 8
Lesson 2: Exploring Patterns in Decimals with a Calculator	Optional	
Lesson 3: Graphing Patterns	Required: see Focus Note 10.3	
Lesson 4: Another Number Pattern	Required	
World of Work: Choreographer	Optional	
Lesson 5: Strategies Toolkit	Optional	
Lesson 6: Tiling Patterns	Optional	
Technology: Using a Computer to Explore Tiling Patterns	Optional	
Unit Problem: Squares Everywhere!	Optional	

10.1: Patterns in Multiplication

Focus Note 10.1

Curriculum expectation:

- Demonstrate, through investigation, an understanding of variables as unknown quantities represented by a letter or other symbol.
- Determine the missing number in equations involving addition, subtraction, multiplication, or division and one- or two-digit numbers, using a variety of tools and strategies.

Curriculum Focus

The curriculum requires that students understand that a variable is an unknown quantity. It also requires that students know how to find the missing number in an addition, subtraction, multiplication, or division equation.

Introduce the term variable as an unknown quantity. Point out to students that the box symbols in the *Practice* questions are variables. In mathematics, a variable is often represented using a letter.

Have students re-write each multiplication sentence in *Practice* questions 3, 4, and 5 as an equation with the box symbol replaced by a letter in the alphabet. Students then find the missing factors by modelling the equations, or by using a guess-and-check strategy. For example, in *Practice* question 3c, students can use a quarter to model 25 and find how many quarters make $2 to find the missing factor.

Some students may begin to make the connection that the two operations, addition and subtraction, are inverse operations, and so are multiplication and division.

Have students complete Master 10.22, Finding Missing Numbers in Equations.

Answers to Master 10.22: 1. a) 9 **b)** 22 **c)** 52 **d)** 6 **e)** 2 **f)** 153 **g)** 24 **h)** 45 **i)** 83
2. 7 **3.** 9 **4.** 12 **5.** 5000

LESSON 10.1A

Multiplicative Relationships

Curriculum expectation: Describe multiplicative relationships between quantities by using simple fractions and decimals.

SECTION ORGANIZER 40–50 min

Curriculum Focus: Find multiplicative relationships between two quantities.

Student Materials
- Masters 5.23, 5.24
- 4 cards numbered 2, 4, 6, 8

Optional
- Step-by-Step 1A (Master 10.25)

Assessment: Master 10.2 Ongoing Observations: Patterns in Number and Geometry

Key Math Learnings

1. Numbers can be related by multiplication.
2. Fractions and decimals can be used to describe the multiplicative relationships between quantities.

BEFORE — Get Started

Ensure students understand the directions and rules for the game. For example, if a player draws a 4, the player should cross out 4 squares in the block under her/his name, and the other player should cross out 4 + 2 (half of 4) = 6 squares. The first player that runs out of squares wins.

DURING — Explore

Ongoing Assessment: Observe and Listen

Ask questions, such as:

- On each turn, which player crosses out more squares? (*The second player—the player who did not draw the card*)
- Why can you never win if you have 1 square left? (*The least number of squares crossed out in any turn is 2.*)

Sample Answers

1. a) Jesse has 1.8 times as many CDs as John has.
b) John has 5 CDs and Jesse has 25 CDs. Jesse has 5 times as many CDs as John has.

2. a) 3
b) 9
c) 4.5
d) 13.5
e) It is 4.5 times the original number.
f) The relationship is the same.

3. a) Divide the amount in June by the amount in February. The amount of precipitation in June is $1\frac{4}{5}$, or 1.8 times, of that in February.
b) The amount of precipitation in December is 4 times of that in February.

REFLECT: If Jane and Phil each gets 2 more stickers, Jane will have 6 and Phil will have 8. Phil thus has $1\frac{1}{3}$ times as many stickers as Jane has, so the relationship is not $1\frac{1}{2}$ times any more.

AFTER — Connect

Encourage students to discuss the rules for the game and what cards are good to draw. Some students may already notice right at the beginning of the game that it is better to draw a card that shows a smaller number while the partner draws one that shows a larger number.

Help students see that the second player can calculate the number of squares to cross out by multiplying the number on the card by 1.5 or $1\frac{1}{2}$.

Practice

Assessment Focus: Question 3

Students should use division to find the multiplicative relationships between the amounts of precipitation. They should be able to make the connection that multiplication and division are inverse operations.

REACHING ALL LEARNERS

Alternative Explore

Materials: chips, number cube labelled 2, 2, 4, 4, 6, 8

Provide each students with 36 chips. Play the game by rolling the number cube instead of drawing a number card, and removing chips instead of crossing out squares. The first player that runs out chips wins the game.

Common Misconception

- Students may struggle to determine which number should be the dividend and which should be the divisor.

How to Help: If students are finding how many times a larger number is greater than a smaller number, divide the large number by the smaller number.

ASSESSMENT FOR LEARNING

What to Look For	What to Do
Knowledge and Understanding √ Students can calculate the multiplicative relationship between two quantities. ***Communication*** √ Students can explain how the multiplicative relationship between two quantities changes as the quantities change. ***Application*** √ Students can use the multiplicative relationship between two quantities to solve problems.	***Extra Support:*** Students can use Step-by-Step 1A (Master 5.25) to complete question 3. ***Extra Practice*:** Use 2 food cans of the same kind that are of different sizes. Have students calculate how many times the volume of one can (from the label) is greater than the other. ***Extension:*** Use the cans from the Extra Practice. Tell students the price of the smaller can. Ask students to calculate what the price of the larger can should be if the relationship between the sizes also holds for the prices.

Recording and Reporting
Master 10.2 Ongoing Observations: Patterns in Number and Geometry

10.3: Graphing Patterns

Focus Note 10.3

Curriculum expectation:
Demonstrate, through investigation, an understanding of variables as changing quantities, given equations with letters or symbols that describe relationships involving simple rates.

Curriculum Focus

The curriculum requires that students understand the meaning of a variable in an equation that describes a relationship involving simple rates.

Extend *Explore* to introduce a variable as a changing quantity.

Let students know that the side length of the square built is a variable that can be represented by the letter *s*. The equation $P = 4 \times s$ represents the relationship between the perimeter of the square (P) and the side length of the square (s). Then have students answer these questions:

When $s = 2$, what is the perimeter of the square? (*Answer: 8*)
When $s = 3$, what is the perimeter of the square? (*Answer: 12*)
When $s = 4$, what is the perimeter of the square? (*Answer: 16*)
When $s = 5$, what is the perimeter of the square? (*Answer: 20*)

Name:_____ Date:_____

Master 10.22

Finding Missing Numbers in Equations

1. Find the missing number in each equation.

a) $9 \times k = 81$ **b)** $w + 16 = 38$ **c)** $r - 7 = 45$

d) $24 \div y = 4$ **e)** $16 \times b = 32$ **f)** $m \div 3 = 51$

g) $49 - s = 25$ **h)** $22 + z = 67$ **i)** $98 - q = 15$

2. Derek jumped rope for 49 min last week.
Each day he jumped the same number of minutes.
How many minutes did Derek jump each day?

3. There were 16 sheets of plywood in a storeroom.
Rachel took some sheets to build a model.
How many sheets did Rachel take if there were 7 sheets left?

4. Anastasia put 18 books on her bookshelf.
Anthony added more books to the shelf until there were 30 books.
How many books did Anthony add to the bookshelf?

5. There are 1000 litres in 1 kilolitre.
A 5-kilolitre container is filled to the top with water.
How many litres of water are in the container?

Name:_____ Date:_____

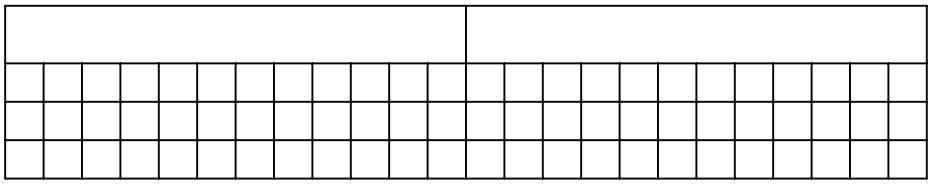
Master 10.23

10.1A Multiplicative Relationships

Explore — Game

Play with a partner.
You will need 4 cards numbered 2, 4, 6, and 8.

- Write your name and your partner's name in this chart.



- Mix the number cards and place them face down in a pile.
- Take turns. On your turn, draw a card and read the number.
  If you can, cross out this number of squares in your block of squares.
  Otherwise, you miss your turn.
- If he can, your partner crosses out one and a half times as many squares in his block.
- The first player to have all squares in his block crossed out wins.
- If both of you are left with 1 square, the game is tied.

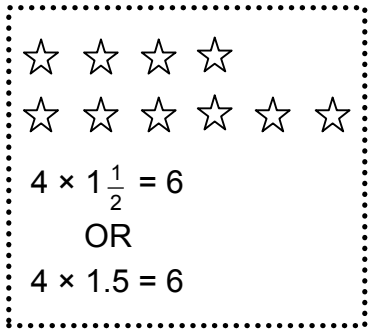
Show *and* Share

Discuss with another pair of students how you won the game.
What is the best number to draw? Why?
How do you calculate the number of squares the other player should cross out at your turn?

Connect

Numbers can be related in many ways.

- Numbers can be related by multiplication.
  Jane has 4 stickers and Phil has 6 stickers.
  We can say,
  "Phil has $1\frac{1}{2}$ times as many stickers as Jane has."
- Multiplication relationships can be expressed using fractions or decimals.
- To find a multiplicative relationship, use division.
  Phillip has 1.5 times as many stickers as Jane has because $6 \div 4 = 1.5$.



Name:_____ Date:_____

Master 10.24

Lesson 10.1A Continued

Practice

1. John has 10 CDs. Jesse has 18 CDs.

a) How many times the number of CDs that John has is the number of CDs that Jesse has?

b) John gives away 5 CDs and Jesse buys 7 more CDs.
How many CDs does each of them has now?
How many times the CDs that John has are the CDs that Jesse has?

2. Write down the number at the end of each step.

a) Think of a number.

b) Double the number. Add this number to the number in part a.

c) Divide your result by 2.

d) Add your results in part b and part c together.

e) How many times of the original number is your final number?

f) Repeat parts a to e for another number. Is the relationship still the same?

3. **Assessment Focus** Use the data in the table.

Month	Average Precipitation (mm)
February	50
June	90
December	200

a) How many times the amount of precipitation in February is the amount of precipitation in June? Write your answer as a fraction and as a decimal. Explain how you know.

b) Write another multiplicative relationship using the data in the table.

Reflect

Jane has 4 stickers and Phil has 6.
So, Phil has $1\frac{1}{2}$ times as many stickers as Jane has.

Suppose they each get 2 more stickers, does Phil still have $1\frac{1}{2}$ times as many stickers as Jane has?
What if they each get twice as many stickers?

Name:_____ Date:_____

Master 10.25

Step-by-Step 1A

Lesson 10.1A, Question 3

Step 1 What is the amount of precipitation in February? _____

What is the amount of precipitation in June? _____

Step 2 Divide the number for June by the number for February in *Step 1*.

How many times the amount of precipitation in February is the amount of precipitation in June? _____

Step 3 Use the result in *Step 2* to complete.

The amount of precipitation in June is _____ times the amount of precipitation in February.

Step 4 What is the amount of precipitation in December? _____

Divide the number for June in *Step 1* by this number for December.

How many times the amount of precipitation in December is the amount of precipitation in June? _____

Step 5 Use the result in *Step 4*. Write a multiplicative relationship between the amounts of precipitation in December and in June.

_____

_____

_____

Unit 11 Probability

Lesson	Curriculum Coverage	Lesson Masters and Materials
Lesson 1: The Likelihood of Events	Required	
Lesson 2: Calculating Probability	Required	
Lesson 3: Probability and Fractions	Required	
Lesson 4: Tree Diagrams	Required	
Lesson 5: Strategies Toolkit	Required	
Lesson 6: Probability in Games	Required	
World of Work: Professional Sports Coach	Optional	
Unit Problem: At the Pet Store!	Optional, but recommended	
Cross Strand Investigation: The Domino Effect	Optional	

Unit Problem: Although this material is not directly required by the Grade 5 curriculum, the material is recommended as a review of probability concepts in this Unit.

Correlation of Ontario Mathematics 2005 Curriculum to Addison Wesley Math Makes Sense 5

Mathematical Process Expectations

The mathematical process expectations are to be integrated into student learning associated with all the strands.

Throughout Grade 5, students will:

Mathematical Process Expectations	***Addison Wesley Mathematics Makes Sense Grade 5*, Correlation:**
Problem Solving develop, select, and apply problem-solving strategies as they pose and solve problems and conduct investigations, to help deepen their mathematical understanding;	*Throughout the program*. ***Math Makes Sense*** follows a problem-solving approach in every lesson, with **Explore** activities that lead students to conceptual understanding at a developmentally appropriate level; **Show & Share** discussions allow students to deepen their mathematical understanding of that central problem through sharing perspectives on the same problem or investigation. **Practice** questions include a range of problem types, regularly including a non-routine problem in the **Assessment Focus** question. Further explicit support in developing problem-solving strategies is featured in **Connect** sections, where mathematical thinking is modeled, and in **Strategies Toolkit** lessons. Students apply their problem-solving strategies throughout each lesson, and in **Unit Problems** and **Cross-Strand Investigations**.

Throughout Grade 5, students will:

Mathematical Process Expectations	***Addison Wesley Mathematics Makes Sense Grade 5*, Correlation:**
Reasoning and Proving develop and apply reasoning skills (e.g., classification, recognition of relationships, use of counter-examples) to make and investigate conjectures and construct and defend arguments;	*Throughout the program.* Because ***Math Makes Sense*** is grounded in a problem-solving approach to developing mathematical ideas, the program consistently calls on students to apply their reasoning skills in the central **Explore** activities, during follow-up **Show & Share** discussions, and in completing a range of **Practice** questions. Discussion prompts and Practice questions regularly ask students to explain their reasoning. **Connect** summaries help to model the reasoning behind mathematical concepts, as they offer consolidation of concepts. **Unit Problems** and **Cross-Strand Investigations** also draw on students' reasoning skills as they work through a more comprehensive problem.

Throughout Grade 5, students will:

Mathematical Process Expectations	***Addison Wesley Mathematics Makes Sense Grade 5*, Correlation:**
Reflecting demonstrate that they are reflecting on and monitoring their thinking to help clarify their understanding as they complete an investigation or solve a problem (e.g., by comparing and adjusting strategies used, by explaining why they think their results are reasonable, by recording their thinking in a math journal);	*Throughout the program.* ***Math Makes Sense*** offers regular opportunities to encourage students to reflect on their strategies and monitor their progress with a problem or investigation, through such features as **Show & Share** discussions in each **Explore**, selected **Practice** questions including **Assessment Focus** questions that direct students to explain their thinking, and **Reflect** prompts at the close of each lesson. **Connect** sections in each lesson model the process of reflection during problem solving.

Through Grade 5, students will:

Mathematical Process Expectations	***Addison Wesley Mathematics Makes Sense Grade 5*, Correlation:**
Selecting Tools and Computational Strategies select and use a variety of concrete, visual, and electronic learning tools and appropriate computational strategies to investigate mathematical ideas and to solve problems;	*Throughout the program*. **Explore** activities either explicitly identify materials to use, to provide students with experience using a range of materials, or they allow students to select the most appropriate tool. Similarly, **Practice** questions may leave the choice of tool to students as they prepare to solve a problem. Students have opportunities to select appropriate computational strategies in the regularly occurring feature entitled **Numbers Every Day. Technology** features and **Technology** lessons develop ongoing expertise in use of electronic learning tools.

Through Grade 5, students will:

Mathematical Process Expectations	***Addison Wesley Mathematics Makes Sense Grade 5*, Correlation:**
Connecting make connections among mathematical concepts and procedures, and relate mathematical ideas to situations or phenomena drawn from other contexts (e.g., other curriculum areas, daily life, sports);	*Throughout the program*. In addition to the ongoing developmental flow, in which applications-based problems surface regularly in **Explore**, **Connect**, and **Practice** questions, the Student Book highlights connections in **Unit Problems**, **Cross-Strand Investigations**, **Math Links**, and feature pages on **The World of Work**.

Through Grade 5, students will:

Mathematical Process Expectations	***Addison Wesley Mathematics Makes Sense Grade 5*, Correlation:**
Representing create a variety of representations of mathematical ideas (e.g., by using physical models, pictures, numbers, variables, diagrams, graphs, onscreen dynamic representations), make connections among them, and apply them to solve problems;	*Throughout the program*. **Explore** activities help develop students' facility with multiple representations through the range of materials and representations to which students are exposed across the course of the program; **Show & Share** discussions encourage students to think about multiple representations of the same concept, while **Connect** summaries model such representations.

Through Grade 5, students will:

Mathematical Process Expectations	***Addison Wesley Mathematics Makes Sense Grade 5*, Correlation:**
Communicating communicate mathematical thinking orally, visually, and in writing, using everyday language, a basic mathematical vocabulary, and a variety of representations, and observing basic mathematical conventions.	*Throughout the program*. In addition to the ongoing developmental flow, supporting Student Book features include: **Show & Share** discussions in each **Explore** activitiy; **Connect** summaries to model consolidation of concepts and mathematical conventions; **Assessment Focus** questions; **Reflect** prompts at the close of each lesson; **Strategies Toolkit** lessons; **Unit Problems**; **Cross-Strand Investigations; Key Words** at the start of each unit, and an illustrated **Glossary**.

Number Sense and Numeration

Overall Expectations

By the end of Grade 5, students will:

- read, represent, compare, and order whole numbers to 100 000, decimal numbers to hundredths, proper and improper fractions, and mixed numbers;
- demonstrate an understanding of magnitude by counting forward and backwards by 0.01;
- solve problems involving the multiplication and division of multi-digit whole numbers, and involving the addition and subtraction of decimal numbers to hundredths, using a variety of strategies;
- demonstrate an understanding of proportional reasoning by investigating whole-number rates.

Student will:

Specific Expectations	***Addison Wesley Mathematics Makes Sense Grade 5*, lessons:**
Quantity Relationships represent, compare, and order whole numbers and decimal numbers from 0.01 to 100 000, using a variety of tools (e.g., number lines with appropriate increments, base ten materials for decimals);	2.1, 4.1, 4.3
demonstrate an understanding of place value in whole numbers and decimal numbers from 0.01 to 100 000, using a variety of tools and strategies (e.g., use numbers to represent 23 011 as 20 000 + 3000 + 0 + 10 + 1; use base ten materials to represent the relationship between 1, 0.1, and 0.01);	2.1, 4.1 with supporting TG note
read and print in words whole numbers to ten thousand, using meaningful contexts (e.g., newspapers, magazines);	2.1
round decimal numbers to the nearest tenth, in problems arising from real-life situations;	4.4
represent, compare, and order fractional amounts with like denominators, including proper and improper fractions and mixed numbers, using a variety of tools (e.g., fraction circles, Cuisenaire rods, number lines) and using standard fractional notation;	8.2, 8.3
demonstrate and explain the concept of equivalent fractions, using concrete materials (e.g., use fraction strips to show that $\frac{3}{4}$ is equal to $\frac{9}{12}$);	8.1

Specific Expectations	*Addison Wesley Mathematics Makes Sense Grade 5*, lessons:
demonstrate and explain equivalent representations of a decimal number, using concrete materials and drawings (e.g., use base ten materials to show that three tenths [0.3] is equal to thirty hundredths [0.30]);	8.4, 8.5
read and write money amounts to $1000 (e.g., $455.35 is 455 dollars and 35 cents, or four hundred fifty-five dollars and thirty-five cents);	6.4
solve problems that arise from real-life situations and that relate to the magnitude of whole numbers up to 100 000;	2.1, 2.13 with supporting BLM
Counting count forward by hundredths from any decimal number expressed to two decimal places, using concrete materials and number lines (e.g., use base ten materials to represent 2.96 and count forward by hundredths: 2.97, 2.98, 2.99, 3.00, 3.01, …; "Two and ninety-six hundredths, two and ninety-seven hundredths, two and ninety-eight hundredths, two and ninety-nine hundredths, three, three and one hundredth, …");	4.1 with supporting TG note
Operational Sense solve problems involving the addition, subtraction, and multiplication of whole numbers, using a variety of mental strategies (e.g., use the commutative property: 5 x 18 x 2 = 5 x 2 x 18, which gives 10 x 18 = 180);	2.2, 2.5, 2.9, 10.1
add and subtract decimal numbers to hundredths, including money amounts, using concrete materials, estimation, and algorithms (e.g., use 10 x 10 grids to add 2.45 and 3.25);	4.6, 4.7, 6.5
multiply two-digit whole numbers by two-digit whole numbers, using estimation, student-generated algorithms, and standard algorithms;	2.10, 2.13 with supporting TG note
divide three-digit whole numbers by one-digit whole numbers, using concrete materials, estimation, student-generated algorithms, and standard algorithms;	2.11, 2.12 with supporting TG note

Specific Expectations	***Addison Wesley Mathematics Makes Sense Grade 5*, pages:**
multiply decimal numbers by 10, 100, 1000, and 10 000, and divide decimal numbers by 10 and 100, using mental strategies (e.g., use a calculator to look for patterns and generalize to develop a rule);	4.8, 4.9 with supporting TG notes
use estimation when solving problems involving the addition, subtraction, multiplication, and division of whole numbers, to help judge the reasonableness of a solution;	2.2, 2.4, 2.5, 2.11, 2.12
Proportional Relationships describe multiplicative relationships between quantities by using simple fractions and decimals (e.g., "If you have 4 plums and I have 6 plums, I can say that I have $1\frac{1}{2}$ or 1.5 times as many plums as you have.");	10.1A (TG lesson)
determine and explain, through investigation using concrete materials, drawings, and calculators, the relationship between fractions (i.e., with denominators of 2, 4, 5, 10, 20, 25, 50, and 100) and their equivalent decimal forms (e.g., use a 10 x 10 grid to show that $\frac{2}{5} = \frac{40}{100}$, which can also be represented as 0.4);	8.4, 8.5 with supporting TG note
demonstrate an understanding of simple multiplicative relationships involving whole-number rates, through investigation using concrete materials and drawings.	1.4, 6.2, 6.3, Cross Strand Investigation, page 402

Measurement

Overall Expectations

By the end of Grade 5, students will:

- estimate, measure and record perimeter, area, temperature change, and elapsed time, using a variety of strategies;
- determine the relationships among units and measurable attributes, including the area of a rectangle and volume of a rectangular prism.

Student will:

Specific Expectations	***Addison Wesley Mathematics Makes Sense Grade 5*, lessons:**
Attributes, Units, and Measurement Sense estimate, measure (i.e., using an analogue clock), and represent time intervals to the nearest second;	6.1
estimate and determine the elapsed time, with and without using a time line, given the durations of events expressed in minutes, hours, days, weeks, months or years;	6.1B (TG lesson)
measure and record temperatures to determine and represent temperature changes over time (e.g., record temperature changes in an experiment or over a season);	5.4 with supporting TG note
estimate and measure the perimeter and area of regular and irregular polygons, using a variety of tools (e.g., grid paper, geoboard, dynamic geometry software) and strategies;	9.5, 9.6, 9.7, 9.8, 9.9
Measurement Relationships select and justify the most appropriate standard unit (i.e., millimetre, centimetre, decimetre, metre, kilometre) to measure length, height, width, and distance, and to measure the perimeter of various polygons;	9.1
solve problems requiring conversion from metres to centimetres and from kilometres to metres;	9.2 with supporting BLM
solve problems involving the relationship between a 12-hour clock and a 24-hour clock (e.g., 15:00 is 3 hours after 12 noon, so 15:00 is the same as 3:00 p.m.);	6.1A (TG lesson)

Specific Expectations	***Addison Wesley Mathematics Makes Sense Grade 5*, lessons:**
create, through investigation using a variety of tools (e.g., pattern blocks, geoboard, grid paper) and strategies, two-dimensional shapes with the same perimeter or the same area (e.g., rectangles and parallelograms with the same base and the same height);	9.5
determine, through investigation using a variety of tools (e.g., concrete materials, dynamic geometry software, grid paper) and strategies (e.g., building arrays), the relationships between the length and width of a rectangle and its area and perimeter, and generalize to develop the formulas [i.e., *Area = length × width; Perimeter = (2 × length) + (2 × width)*];	9.7, 9.8
solve problems requiring the estimation and calculation of perimeters and areas of rectangles;	9.7, 9.8
determine, through investigation, the relationship between capacity (i.e., the amount a container can hold) and volume (i.e., the amount of space taken up by an object), by comparing the volume of an object with the amount of liquid it can contain or displace (e.g., a bottle has a volume, the space it takes up, and a capacity, the amount of liquid it can hold);	6.8
develop, through investigation using stacked congruent rectangular layers of concrete materials, the relationship between the height, the area of the base, and the volume of a rectangular prism, and generalize to develop the formula (i.e., *Volume = area of base × height*);	6.7A (TG lesson)
select and justify the most appropriate standard unit to measure mass (i.e., milligram, gram, kilogram, tonne).	6.9, 6.10

Geometry and Spatial Sense

Overall Expectations

By the end of Grade 5, students will:

- identify and classify two-dimensional shapes by side and angle properties, and compare and sort three-dimensional figures;
- identify and construct nets of prisms and pyramids;
- identify and describe the location of an object, using the cardinal directions, and translate two-dimensional shapes.

Students will:

Specific Expectations	***Addison Wesley Mathematics Makes Sense Grade 5*, lessons:**
Geometric Properties distinguish among polygons, regular polygons, and other two-dimensional shapes;	3.1, 3.4
distinguish among prisms, right prisms, pyramids and other three-dimensional figures;	3.6 with supporting BLM
identify and classify acute, right, obtuse, and straight angles;	3.2 with supporting TG note
measure and construct angles up to 90º, using a protractor;	3.2
identify triangles (i.e., acute, right, obtuse, scalene, isosceles, equilateral) and classify them according to angle and side properties;	3.1, 3.4
construct triangles, using a variety of tools (i.e., protractor, compass, dynamic geometric software), given acute or right angles and side measurements;	3.5
Geometric Relationships identify prisms and pyramids from their nets;	3.6
construct nets of prisms and pyramids, using a variety of tools (e.g., grid paper, isometric dot paper, Polydrons, computer application);	3.6, Unit 3 Technology Feature, page 102
Location and Movement locate an object using the cardinal directions (i.e., north, south, east, west) and a coordinate system (e.g., "If I walk 5 steps north and 3 steps east, I will arrive at the apple tree.");	7.1 with supporting TG note
compare grid systems commonly used on maps (i.e., the use of numbers and letters to identify an area; the use of a coordinate system based on the cardinal directions to describe a specific location);	7.1 with supporting TG note

Specific Expectations	*Addison Wesley Mathematics Makes Sense Grade 5*, lessons:
identify, perform, and describe translations using a variety of tools (e.g., geoboard, dot paper, computer program);	7.2
create and analyse designs by translating and/or reflecting a shape, or shapes, using a variety of tools (e.g., geoboard, grid paper, computer program).	7.6, 10.6, Unit 10 Technology Feature, page 371

Patterning and Algebra

Overall Expectations

By the end of Grade 5, students will:

- determine, through investigation using a table of values, relationships in growing and shrinking patterns, and investigate repeating patterns involving translations;
- demonstrate, through investigation, an understanding of the use of variables in equations.

Students will:

Specific Expectations	***Addison Wesley Mathematics Makes Sense Grade 5*, lessons:**
Patterns and Relationships create, identify, and extend numeric and geometric patterns, using a variety of tools (e.g., concrete materials, paper and pencil, calculators, spreadsheets);	1.1, 1.3, 1.4, 1.5, 10.3, 10.4
build a model to represent a number pattern presented in a table of values that shows the term number and the term;	1.2, 10.3
make a table of values for a pattern that is generated by adding or subtracting a number (i.e., a constant) to get the next term, or by multiplying or dividing by a constant to get the next term, given either the sequence (e.g., 12, 17, 22, 27, 32, …) or the pattern rule in words (e.g., start with 12 and add 5 to each term to get the next term);	1.2, 1.3, 1.4
make predictions related to growing and shrinking geometric or numeric patterns ;	1.1, 1.3, 10.3, 10.4
extend and create repeating patterns that result from translations, through investigation using a variety of tools (pattern blocks, dynamic geometry software, dot paper);	7.2 with supporting TG note
Variables, Expressions, and Equations demonstrate, through investigation, an understanding of variables as changing quantities, given equations with letters or symbols that describe relationships involving simple rates (e.g., the equations $C = 3 \times n$ and $3 \times n = C$ both represent the relationship between the total cost (C), in dollars, and the number of sandwiches purchases (n), when each sandwich costs $3);	10.3 with supporting TG note

Specific Expectations	***Addison Wesley Mathematics Makes Sense Grade 5*, lessons:**
demonstrate, through investigation, an understanding of variables as unknown quantities represented by a letter or other symbol (e.g., 12 = 5 + ☐ or 12 = 5 + *s* can be used to represent the following situations: "I have 12 stamps altogether and 5 of them are from Canada. How many are from other countries?");	10.1 with supporting TG note
determine the missing number in equations involving addition, subtraction, multiplication, or division and one- or two-digit numbers, using a variety of tools and strategies (e.g., modelling with concrete materials, using guess and check with and without the aid of a calculator).	10.1 with supporting BLM

Data Management and Probability

Overall Expectations

By the end of Grade 5, students will:

- collect and organize discrete or continuous primary data and secondary data and display the data using charts and graphs, including broken-line graphs;
- read, describe, and interpret primary data and secondary; data presented in charts and graphs, including broken-line graphs;
- represent as a fraction the probability that a specific outcome will occur in a simple probability, experiment, using systematic lists and area models.

Students will:

Specific Expectations	***Addison Wesley Mathematics Makes Sense Grade 5*, lessons:**
Collection and Organization of Data distinguish between discrete data (i.e., data organized using numbers that have gaps between them, such as whole numbers, and often used to represent a count, such as the number of times a word is used) and continuous data (i.e., data organized using all numbers on a number line that fall within the range of the data, and used to represent measurements such as heights or ages of trees);	5.3 with supporting TG note
collect data by conducting a survey or an experiment (e.g., gather and record air temperature over a two-week period) to do with themselves, their environment, issues in their school or community, or content from another subject, and record observations or measurements;	5.3. 5.5, Unit 5 Problem
collect and organize discrete or continuous primary data and secondary data and display the data in charts, tables, and graphs (including broken-line graphs) that have appropriate titles, labels (e.g., appropriate units marked on the axes), and scales that suit the range and distribution of the data (e.g., to represent precipitation amounts ranging from 0 mm to 50 mm over the school year, use a scale of 5 mm for each unit on the vertical axis and show months on the horizontal axis) using a variety of tools (e.g., graph paper, simple spreadsheets, dynamic statistical software);	5.3, 5.4, Unit 5 Technology Features, pages 163, 169, and 176

Specific Expectations	*Addison Wesley Mathematics Makes Sense Grade 5*, lessons:
demonstrate an understanding that sets of data can be samples of larger populations (e.g., to determine the most common shoe size in your class, you would include every member of the class in the data; to determine the most common shoe size in Ontario for your age group, you might collect a large sample from classes across the province);	5.5
describe, through investigation, how a set of data is collected (e.g., by survey, measurement, observation) and explain whether the collection method is appropriate;	5.3 with supporting TG note
Data Relationships read, interpret, and draw conclusions from primary data (e.g., survey results, measurements, observations), and from secondary data (e.g., precipitation or temperature data in the newspaper, data from the Internet about heights of buildings and other structures), presented in charts, tables and graphs (including broken-line graphs);	5.1, 5.3, 5.4
calculate the mean for a small set of data and use it to describe the shape of the data set across its range of values, ,using charts and graphs (e.g., "The data values fall mainly into two groups on both sides of the mean."; "The set of data is not spread out evenly around the mean.");	5.2 with supporting TG note
compare similarities and differences between two related sets of data, using a variety of strategies (e.g., by representing the data using tally charts, stem-and-leaf plots, double bar graphs, or broken-line graphs; by determining measures of central tendency [i.e., mean, median, and mode]; by describing the shape of a data set across its range of values;	5.4A (TG lesson)

Specific Expectations	***Addison Wesley Mathematics Makes Sense Grade 5*, lessons:**
Probability determine and represent all the possible outcomes in a simple probability experiment (e.g., when tossing a coin, the possible outcomes are heads and tails; when rolling a number cube, the possible outcomes are 1, 2, 3, 4, 5, and 6), using systematic lists and area models (e.g., a rectangle is divided into two equal areas to represent the outcomes of a coin toss experiment);	11.2, 11.4, 11.5
represent, using a common fraction, the probability that an event will occur in simple games and probability experiments (e.g., "My spinner has four equal sections and one of those sections is coloured red. The probability that I will land on red is $\frac{1}{4}$);	11.2, 11.3
pose and solve simple probability problems, and solve them by conducting probability experiments and selecting appropriate methods for recording the results (e.g., tally chart, line plot, bar graph).	11.1, 11.2, 11.3, 11.6

Addison Wesley Mathematics Makes Sense

Program Authors

Peggy Morrow
Ralph Connelly
Bryn Keyes
Jason Johnston
Steve Thomas
Jeananne Thomas
Angela D'Alessandro
Maggie Martin Connell
Don Jones
Michael Davis
Sharon Jeroski
Trevor Brown
Nora Alexander
Cynthia Pratt Nicolson

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